

III. CONTRIBUTIONS TO THE STUDY OF THE FRESH WATER FISHES OF THE ISLAND OF FORMOSA.

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(PLATES XLVIII-LIII.)

INTRODUCTION.

The Island of Formosa, lies in the western Pacific Ocean, between the Southern and Eastern China Seas and is separated from the Chinese mainland by the Formosan Strait, which has a width of about ninety miles in its narrowest part. It is two hundred and five miles long and from sixty to eighty miles broad, having seven hundred and thirty-one miles of coast-line and an area of 13,429 square miles, being thus nearly of the same size as Kiushiu, the southernmost island of Japan proper.

The island is traversed throughout its length by a fine mountain range, which reaches an altitude of from 8,000 to 12,000 feet, Mt. Niitaka (14,270 ft.) stands in the middle and Mt. Silvia (12,480 ft.) in the north. In addition, along the eastern shore there are coast ranges of considerable height, the bases of which form magnificent cliffs from fifteen to twenty-five hundred feet high. Thus the middle part and the eastern side of the island are mountainous, while the west is covered by fertile plains.

Because of the above mentioned topography, there are very few rivers on the eastern coast, while on the western coast there are many of considerable length, namely, Tamsui, Hozan, Koro, Daian, Daito, Dakusui, Seira, Shinkobi, Sobun, and Shimo-Tamsui, of which the last-named is the largest. In addition to these, there is a lake called Jitsugetsutan (Lake Candidius), which has a small outlet into the River Dakusui.

Until a comparatively recent date the Island of Formosa was a "terra incognita" to the naturalist, and the fresh-water fishes, which are especially valuable as confirming the geographical relationship between isolated islands and continents, were quite unknown.

When Albert Günther published his "Catalogue of Fishes" in 1859-1870, he had only sixteen species of Formosan fresh-water fishes to

enumerate. After a lapse of more than twenty years Jordan and Evermann reported one hundred and eighty-six species of Formosan fishes, including twenty-seven which were found in the fresh waters. Since that publication the efforts of Regan, Jordan and Richardson, and Boulenger have raised the total number of Formosan fresh-water fishes from thirty-two to forty-three.

In the present paper is given a record of an extensive collection of the fresh-water fishes of the Island of Formosa, chiefly made by Mr. Takeo Aoki, my assistant, during the years 1915-1917, making an addition of seven new genera, fifteen new, and eighteen unrecorded species.

NEW GENERA.

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|-------------------------|----------------------------|
| 1. <i>Formosania</i> . | 4. <i>Acrossocheilus</i> . |
| 2. <i>Spinibarbus</i> . | 5. <i>Phoxiscus</i> . |
| 3. <i>Scaphesthes</i> . | 6. <i>Aristichthys</i> . |
| 7. <i>Cultricolus</i> . | |

NEW SPECIES.

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|---------------------------------------|--------------------------------------|
| 1. <i>Pseudobagrus taiwanensis</i> . | 8. <i>Scaphesthes tamusuiensis</i> . |
| 2. <i>Pseudobagrus adiposalis</i> . | 9. <i>Gnathopogon iijimæ</i> . |
| 3. <i>Liobagrus nantoënsis</i> . | 10. <i>Phoxiscus kikuchii</i> . |
| 4. <i>Formosania gilberti</i> . | 11. <i>Culter aokii</i> . |
| 5. <i>Labeo jordani</i> (introduced). | 12. <i>Macropodus filamentosus</i> . |
| 6. <i>Puntius snyderi</i> . | 13. <i>Rhinogobius taiwanus</i> . |
| 7. <i>Spinibarbus hollandi</i> . | 14. <i>Rhinogobius formosanus</i> . |
| 15. <i>Glossogobius parvus</i> . | |

SPECIES NOT HITHERTO RECORDED.

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| 1. <i>Parasalanx ariakensis</i> . | 10. <i>Cultricolus kneri</i> . |
| 2. <i>Cobitis tænia</i> . | 11. <i>Oryzias latipes</i> . |
| 3. <i>Caupoeta semifasciolata</i> . | 12. <i>Gambusia affinis</i> (introd.). |
| 4. <i>Pseudorasbora parva</i> . | 13. <i>Mugil cephalus</i> . |
| 5. <i>Distachodon tumirostris</i> . | 14. <i>Mugil carinatus</i> . |
| 6. <i>Rhodeus ocellatus</i> . | 15. <i>Polyacanthus operculatus</i> . |
| 7. <i>Zacco temminckii</i> . | 16. <i>Sicyopterus japonicus</i> . |
| 8. <i>Hypophthalmichthys molitrix</i>
(introduced). | 17. <i>Butis butis</i> . |
| 9. <i>Aristichthys nobilis</i> (introd.). | 18. <i>Glossogobius grammepomus</i> . |

It is very difficult to draw a hard and fast line between true fresh-water fishes and brackish-water fishes. Therefore in the following pages the descriptions of all the fishes which were found in the fresh waters are given. For the sake of completeness I have added the descriptions of five known species, namely: *Parasalanx acuticeps*, *Liobagrus formosanus*, *Ischikauia macrolepis*, *Anguilla sinensis*, and *Glossogobius abacopus*, of which I have not seen specimens.

The typical portions of the collections, including the type specimens, and the others which are described in the present paper, are preserved in the Carnegie Museum in Pittsburgh. A second set, including cotypes of the new species, is deposited in the Museum of Leland Stanford Junior University. The remainder is reserved for the Institute of Science, Government of Formosa.

It has been my good fortune during a visit to Leland Stanford Junior University to be able to examine types and other specimens, and to use the reference books and literature quite freely. For this privilege I wish to express my sincere gratitude to the authorities of the University. In the preparation of the present paper I have received the kind and valuable assistance of Dr. David Starr Jordan, Dr. Charles Henry Gilbert, and Prof. John Otterbein Snyder, for whose courtesy I express my hearty thanks.

Family SALMONIDÆ.

Genus PLECOGLOSSUS Temminck & Schlegel.

1846. *Plecoglossus* TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., p. 229.
(Type *Plecoglossus altivelis* Temminck & Schlegel.)

Body moderately elongate, covered with very small scales. Mouth wide, the premaxillaries with a few, small, conical, pointed teeth. Maxillaries and lower jaw with teeth of peculiar form, lamelliform, broad, truncate, serrate, movable, seated in folds of the skin; mandibles each ending in a small knob, not jointed at the symphysis. Mucous membrane of interior of mouth between terminal halves of the mandible forming a peculiar organ, raised in folds with two pouches in front and one behind. Tongue very small, with minute teeth, its tip toothless; no teeth on vomer, palatines with teeth. Pyloric cæca very numerous. Eggs small. Small fishes inhabiting the clear streams of Japan and Formosa, migratory like the salmon, and among the very finest of food-fishes. One species is known (Jordan & Snyder).

Distribution: Japan proper; Corea; Formosa.

1. *Plecoglossus altivelis* (Temminck & Schlegel).

1846. *Plecoglossus altivelis* TEMMINCK & SCHLEGEL, Fauna Japonica Poiss., p. 229, Pl. CV, Fig. 1; no locality.—GÜNTHER, Cat. Fish., VI, 1866, p. 165; Japan; Formosa.—ISHIKAWA, Zoöl. Mag. Tokyo, VII, 1895, p. 129; Japan.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, 1901, p. 349; Lake Biwa.—Proc. U. S. Nat. Mus., XXIII, 1901, p. 744; Numata, Tsushima.—Proc. U. S. Nat. Mus., XXIV, 1902, p. 584; Ishikari River, Niigata; Aomori; Same; Matsushima; Sendai; Morioka; Tokyo; Tama River; Daiya River; Gifu; Lake Biwa; Osaka; Wakanoura; Kobe; Hiroshima; Kijūme; Nagasaki; Tamsui River, Formosa.—JORDAN, Ann. Zoöl. Jap., IV, 1902, p. 75.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 323; Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 167; Formosa.—SMITH & POPE, Proc. U. S. Nat. Mus., XXXI, 1905, p. 463; Gifu.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 403; Tsuruga.—JORDAN; SNYDER, and TANAKA, Journ. Coll. Sci., Tokyo, XXXIII, 1913, p. 44, Japan; Hokkaido; Corea; Formosa.—JORDAN & METZ, Mem. Carneg. Mus., VI, 1913, p. 10, Fusan, Corea.

Ayu (Japan); Kyarihi (Formosa).

Head 4.88 in length; depth 4.27; D. 10, A. 17; P. 14; V. 8; width of head 2 in its length; eye 5.33 in head; interorbital space 2.76; snout 2.76; maxillary 2; scales in the lateral line about 150, in an oblique series between origin of dorsal and lateral line 20, between the latter and the middle of belly 20, between lateral line and the root of ventral 13; pectoral 1.22 in head; ventral 1.22; gill-rakers 16 + 19.

Body oblong, a little compressed, curvature of the dorsal profile stronger than the ventral; head rather small, triangular, its dorsal surface slightly convex; snout rather long, acutely pointed; interorbital space slightly convex; mouth large, oblique, its angle reaching a vertical through the posterior border of orbit; lips thick; premaxillary well-developed; lower jaw shorter than the upper; palatines with minute teeth; six premaxillary teeth, minute and sharply pointed; maxillary teeth modified into serrated plates, twelve on both jaws; eyes moderate, superior and anterior; nostrils close together; gill-rakers short and slender.

Origin of the dorsal nearer tip of snout than base of caudal, opposite the ventral, rather high, each ray rather stiff; adipose dorsal very small, inserted above posterior third of the base of anal; pectoral as long as the ventral, not reaching the latter; ventral inserted below origin of dorsal, not reaching the vent; anal fin elongate, rather low, outer margin concave; caudal peduncle slender, its depth 2.18 in the length of head.

Body covered with small cycloid scales; head naked; lateral line complete, extending along the middle of the sides, a little decurved.

Color light bluish green above, paler below; belly yellowish; dorsals, pectorals, adipose dorsal, and caudal fin dusky; ventrals and anal whitish.

Total length 273 mm.

Described from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1915 (Female).

Habitat: Tamusui River; Choso River; Taiko, Giran.

Remarks: The anal fin of the male is higher and shorter than that of the female. The present species is distributed only in the rivers of the northern part of the island, mainly in the Tamusui River.

MEASUREMENTS OF *Plecoglossus altivelis*.

Locality	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Intra-orbital.	Snout.	Eye.	Scales.	Length, Mm.
Tamusui River.....	5.37	4.25	10	17	13	8	1.88	2.94	2.76	5	21-150-20	283
Tamusui River.....	4.88	4.27	10	17	14	8	2	2.76	2.76	5.33	20-150-20	273
Choso River.....	4.30	4.52	11	17	14	8	2	2.90	2.75	5	21-155-20	172
Taiko.....	4.44	4.44	11	17	15	8	2.15	2.89	2.80	5	20-145-21	140

Family SALANGIDÆ.

Genus PARASALANX Regan.

1908 *Parasalanx* REGAN, Ann. Mag. Nat. Hist. (8), 11, p. 444. (Type *Parasalanx gracillimus* Regan.)

Body slender, translucent, elongate, cylindrical, flattened anteriorly, compressed posteriorly, naked. Head elongate, much depressed, with long, flat, pointed snout; premaxillaries forming an anterior triangular expansion; lower jaw not projecting, ending in a distinct, more or or less movable presymphysial bone, with double series of teeth; tongue toothless. Dorsal fin partly above the anal; adipose fin present, small and low; caudal fin forked.

Distribution: China; Formosa; Japan.

KEY TO THE FORMOSAN SPECIES.

- a. Depth of body 11 times in length. *acuticeps*.
- aa. Depth of body more than 15 times in length. *ariakensis*.

2. *Parasalanx acuticeps* (Regan).

1908. *Salanx acuticeps* REGAN, Ann. Mag. Nat. Hist. (8), II, p. 360; Lake Candidius, Formosa.
1908. *Parasalanx acuticeps* REGAN, Ann. Mag. Nat. Hist. (8), II, p. 446; Lake Candidius, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., Vol. IV, no. 4, 1909, p. 167; Lake Candidius (after Regan).

Depth of body 11 in length, length of head 5.5 to 5.66. Head three times as long as broad; snout acutely pointed, shorter than post-orbital part of head; diameter of eye eight times in the length of head. Lower jaw not projecting, with a toothed prementary bone and with anterior canines which perforate the roof of the mouth; tongue toothless. Dorsals 13-14. Anal 26-27, originating below the second ray of dorsal. Pectoral with nine or ten rays; origin of pelvic nearer to anal than to base of pectoral.

Two specimens, 115 mm. in total length. (Regan).

Habitat: Lake Candidius (Regan).

Remarks: Not seen.

3. *Parasalanx ariakensis* (Kishinouye).

1902. *Salanx ariakensis* (KISHINOUE) JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIV, p. 592; Ariake Sea, Japan.—JORDAN, SNYDER & TANAKA, Journ. Coll. Sci., XXXIII, 1913, p. 47; Ariake Sea.
1908. *Hemisalanx ariakensis* REGAN, Ann. Mag. Nat. Hist. (8), II, p. 445; Ariake Sea (after Jordan & Snyder).

Head 5.85 in length; depth at insertion of the anal 15 in length; depth of caudal peduncle 4.5 in head; eye 6; interorbital space 3; snout 2.166 D. 13; A. 28; P. 9; V. 7.

Body elongate, cylindrical, strongly flattened anteriorly, posterior part compressed, highest in front of the insertion of anal; head flat, much broader than body, height 2.5 in its width; snout spatulate, premaxillaries forming an anterior triangular expansion, tip sharply pointed; jaws subequal; teeth on both jaws and vomers in a single row, those on the upper jaw stronger and set apart, recurved and canine-like; vomerine teeth minute; three pairs of sharp, recurved canine-like teeth near the tip of lower jaw, which are received into a pouch-like concavity of the upper jaw behind premaxillaries; tongue toothless; eyes lateral, prominent.

Dorsal fin inserted on posterior four-fifteenths of body, partly above the anal; adipose dorsal low, originating at the end of base of anal; pectoral subhorizontal; origin of ventral midway between tip of

snout and base of caudal, anterior ray longest; caudal fin deeply forked, the tip of each lobe sharply pointed.

Head and body naked.

Color white, except eyes; two longitudinal series of small black spots along the ventral median line.

Total length 80 mm.

Described from a specimen from Tamusui River near Taihoku, collected by Oshima in February, 1917.

Habitat: Tamusui River.

Remarks: All the characters of the present species agree quite well with those of the cotype in the Stanford University collections.

In the year 1908, Regan noted in his paper (Ann. Mag. Nat. Hist. (8), II, p. 445) that *Salanx ariakensis* (Kishinouye) described by Jordan & Snyder might belong to the genus *Hemisalax*. However, the lower jaw of the present species does not project and the premaxillaries form an anterior triangular expansion. Such being the case, it seems reasonable to include *Salanx ariakensis* in the genus *Parasalanx*.

MEASUREMENTS OF *Parasalanx ariakensis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Snout.	Eye.	Interorbital.	Length. Mm.
Tamusui River.....	5.85	15	13	28	9	7	2.60	2.166	6	3	80
Tamusui River.....	5.83	15.75	13	26	9	7	2.75	2.40	6	3.66	70
Tamusui River.....	5.92	15.60	13	28	8	7	2.60	2.33	6	3.5	77
Tamusui River.....	6	15	13	27	9	7	2.60	2.166	6.5	3.5	78
Tamusui River.....	6.16	17.75	13	28	9	7	2.75	2.20	5.5	3.33	74
Ariake Sea											
(Cotype; No. 8574); S. U. .	5.33	16.57	13	28	9	7	3	2.33	6.33	3.66	125
(Cotype; No. 8574); S. U. .	5.42	17.33	13	29	9	7	2.71	2.375	7	3.5	112

Family SILURIDÆ.

ARTIFICIAL KEY TO THE FORMOSAN GENERA.

- I. Dorsal fin spineless; anal very long.
 - a. Dorsal fin many-rayed, very long, uniformly composed of feeble rays; four pairs of barbels.....*Clarias*.
 - aa. Dorsal fin very short, rudimentary; two pairs of barbels..*Parasilurus*.
- II. Dorsal fin with a pungent spine; anal moderate.
 - a. Adipose dorsal fin not adnate, free behind; mental barbels as usual, median pair not notably distant; dorsal spine smooth or denticulated; pectoral spine denticulated behind.....*Pseudobagrus*.
 - aa. Adipose dorsal fin adnate to the back and connected with the caudal; median mental barbels far apart; dorsal and pectoral spines smooth, sharp, and imbedded in the skin.....*Liobagrus*.

Genus PARASILURUS Bleeker.

1856. *Glanis* AGASSIZ, Proc. Amer. Acad., p. 333 (Name pre-occupied by *Glanis* Gronow, 1854). (Type *Glanis aristotelis* Agassiz.)
 1863. *Parasilurus* BLEEKER, Nederl. Tydschr. Dierk., p. 114. (Type *Silurus asotus* Linnaeus.)

Body elongate, the profile of the back almost horizontal. Head depressed and covered with soft skin; eyes anterior and subcutaneous; mouth broad, transverse; four barbels, two maxillary, which are very long, two mental, which are short; teeth cardiform or villiform, in broad bands in the jaw and on vomer; no teeth on palatines. Gill-opening wide, not confluent with isthmus, and narrowly jointed together. Dorsal small, without spine, and anterior; adipose fin absent; anal more or less united with the caudal, very long; pectorals with spine; ventral behind dorsal. Air-bladder not inclosed in bone. (Jordan & Fowler.)

Distribution: India; East Indies; Formosa; China; Corea; Amur Province; Japan.

4. *Parasilurus asotus* (Linnaeus).

Namadzu (Japan); Ryamhii (Formosa).

1758. *Silurus asotus* LINNÆUS, Syst. Nat. Ed. X, p. 501; Asia.—BLOCH & SCHNEIDER, Syst. Ichth., 1801, p. 375.—Basilewsky, Nouv. Mem. Soc. Nat. Mosc., X, 1855, p. 240, Pl. 3, Fig. 4; China.—GÜNTHER, Cat. Fish., V, 1864, p. 33; Japan; China.—Ann. Mus. St. Petersb., 1896, p. 11; Huihsien, China.—ISHIKAWA, Prel. Cat., 1897, p. 23; Japan.—GÜNTHER, Ann. Mag. Nat. Hist. (7), I, 1898, p. 261; Newchang.—POPTA, Zool. Anz., XXXII, 1907, p. 250; Kiautschau, China.
 1846. *Silurus xanthosteus* RICHARDSON, Ichthyol. China, p. 281; Canton; Chusan.—Voy. Sulph., Fishes, p. 133, Pl. 56, Fig. 12-14.
 1846. *Silurus japonicus* SCHLEGEL, Fauna Japonica, Poiss., p. 226, Pl. CIV, Fig. 1; Higo; Satsuma; Nagasaki.—BLEEKER, Verh. Batav. Genootsch., XXV, 1855, pp. 30 and 51.
 1846. *Silurus sinensis* RICHARDSON, Ichthyol. China, p. 281; Chusan.
 1867. *Silurus (Parasilurus) asotus* KNER, Novara, Fisch., III, p. 303; Shanghai.
 1901. *Parasilurus asotus* JORDAN & SNYDER, Ann. Zool. Jap., III, p. 45; Yokohama.—Abbott, Proc. U. S. Nat. Mus., XXIII, 1901, p. 83; Pei-ho, China.—JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, 1903, p. 903; Tokyo; Niigata; Morioka; Tama River; Kawatana; Sendai; Ichinoseki; Chikugo River; Tsuchiura; Lake Biwa; Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 163; Formosa.—BERG, Ichthyol. Amur., 1909, p. 175; Amur Province.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 403; Tokyo; Takamatsu River.—Jordan & Metz, Mem. Carneg. Mus., VI, No. 2, 1913, p. 12; Corea.
 1903. *Glanis asotus* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 320; Tamusui River, Formosa.

1913. *Parasilurus asotus* JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, p. 58; Japan.

Head 4.83 in length; depth 6.20; D. 5; A. 75; P. 1.12; V. 11; width of head 1.33 in its length; eye 8 in head, 3 in snout, 4 in interorbital space; interorbital space 2 in head; pectoral 1.66; ventral 2.14.

Body elongate, posterior part compressed, anterior part more or less depressed; tail long and tapering; head flat and broad; snout depressed, broadly rounded anteriorly; lips thin and smooth, lower jaw somewhat protruding; eyes oval, supra-lateral, and anterior; nostrils far apart, distance between anterior and the posterior nostril equal to the distance between the latter and eye, anterior nostril in a short tube; mouth very broad and superior; teeth sharp, in broad villiform bands in the jaws, vomers, and palatines; barbels four, two maxillary, nearly as long as head, two mental, very short, about 4 in head; interorbital space very broad, its middle part somewhat depressed; gill-openings large; gill-rakers 1 + 10, rather short, and widely set; gill-membranes entirely separated.

Dorsal fin shorter than ventral, distance to pectoral twice as long as the distance to ventral; anal fin very long, united with caudal behind, of uniform height, its origin much in advance of the middle of the length; pectoral armed with a short strong spine, both edges of which

MEASUREMENTS OF *Parasilurus asotus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Eye.	Snout.	Interorbital.	Pectoral.	Ventral.	Length. Mm.
Jitsugetsutan.	4.83	6.20	5	75	1, 12	11	1.33	8	2.64	2	1.66	2.14	330
Tamusui River.	5	6.5	5	78	1, 11	11	1.4	8.5	3	2.5	1.83	2.5	242
Inzanpo.	4.57	6.4	5	75	1, 12	11	1.33	7.33	3.6	2	2	2.2	180
Ritakukan.	4.33	6.23	5	73	1, 12	11	1.73	7	3	2.4	1.72	2.28	150

bear denticulations, inner ones stronger; ventral fins shorter than the pectoral, reaching behind the origin of anal; caudal fin very slightly emarginate, each lobe obtusely rounded; anal papilla present.

Body smooth, naked; lateral line distinct, extending along the middle of sides, continuous.

Color in formalin uniformly dark gray, lower surface of head and abdomen whitish.

Total length 330 mm.

Described from a specimen from Jitsugetsutan (Lake Candidius), collected by T. Aoki in September, 1916.

Habitat: Distributed throughout the island. My specimens are from Jitsugetsutan (Lake Candidius); Tamusui River; Inzanpo; Ritakukan.

Genus PSEUDOBAGRUS Bleeker.

1860. *Pseudobagrus* BLEEKER, Act. Soc. Indo-Nederl., VII, p. 87. (Type *Bagrus aurantiacus* Temminck & Schlegel).

Body moderately elongate. Head broad and compressed, covered above by moderately thick, smooth skin; eyes moderate or rather small; snout broad, obtuse; mouth broad, transverse, and with bands of villiform teeth in the jaws; a continuous transverse band of teeth on the roof of the mouth; nostrils remote, the anterior usually in a small tube; eight barbels, the maxillaries longest, and the mentals more or less evenly distributed. Dorsal fin short, with five to seven rays, and like the pectoral with a stout spine; caudal rounded or subtruncate; anal with twenty or more radii; ventrals broad, with six rays. (Jordan & Fowler.)

SYNOPSIS OF THE FORMOSAN SPECIES.

- A. Depth of body 6.43-7.40 in length; origin of the dorsal in advance of the tip of the pectoral.
- a. Maxillary barbels long, reaching the tip of operculum; adipose dorsal shorter than the anal; anal fin 15-rayed; pectoral I, 7; caudal fin slightly emarginate.....*taivanus*.
 - aa. Maxillary barbels short, not reaching the tip of operculum; adipose dorsal longer than the anal; anal fin 18-19-rayed; pectoral I, 8-9; caudal fin rounded.....*adiposalis*.
- B. Depth of body 4.5-5.33 in length; origin of the dorsal above the tip of the pectoral.
- a. Maxillary barbels long, reaching beyond the tip of operculum; adipose dorsal longer than the anal; anal fin 15-rayed; pectoral I, 7; caudal fin slightly emarginate.....*brevianalis*.

5. *Pseudobagrus brevianalis* Regan.

Sankakuko (Formosa).

1908. *Pseudobagrus brevianalis* REGAN, Ann. Mag. Nat. Hist. (8), Vol. 1, p. 149; Lake Candidius, Formosa.

Head 4 in length; depth 5.33; D. I, 7; A. 15; P. I, 7; V. 6; width of head 1.33 in its length; eye 8.5 in head; snout 2.5; inter-orbital space 2.33; pectoral 1.75; ventral 2.28.

Body elongate, higher in front, posterior part compressed, cross-section of the anterior part triangular; head rather flat, its top gradually inclining anteriorly; snout broad, obtusely rounded anteriorly,

projecting beyond the lower jaw; mouth inferior, transverse, crescent-shaped, with fleshy thick lips, the upper more or less papillose; lower jaw much thinner, and distinct at the angle of the mouth only; both jaws with broad bands of villiform teeth; a subcrescentic narrow band of villiform teeth on the palate; eight barbels, four on the snout, the other four on the mentum; maxillaries long, one and one-half times in the length of head, scarcely reaching the base of the pectoral, nasal barbels as long as median mentals; eyes small, covered with thin skin, lateral and superior; nostrils separated, the anterior in a short tube, situated in a shallow groove just behind the upper lip, posterior nostrils behind the root of nasal barbels; gill-openings large, extending to upper part of the base of the pectorals; gill-membranes not confluent with the skin of isthmus, their posterior margins entirely free; gill-rakers 3 + 8, slender.

Origin of the dorsal above the tip of pectoral, its spine rather slender, nearly two-thirds as long as the dorsal; adipose dorsal rather short, above the anal, and inserted in front of anus, slightly longer than the anal; pectoral with a spine, its inner edge strongly serrated; ventral short, tip reaching the anus; anal fin rather short; anal papilla, not well developed, very short; caudal fin emarginate, each lobe rounded at the tip; caudal peduncle elongate, slightly higher posteriorly, its deepest part twice in length of head.

Body naked, smooth; lateral line continuous, extending along the middle of the sides.

Color in formalin uniformly brownish gray, without any markings; belly and throat whitish.

Total length 130 mm.

The present description is from a specimen from Jitsugetsutan (Lake Candidius), collected by T. Aoki in August, 1916.

Habitat: Jitsugetsutan (Lake Candidius); Dainansho, Nanto.

Remarks: Regan's type specimen is provided with a 16-18-rayed anal fin, instead of being 15-rayed as in the present specimen.

MEASUREMENTS OF *Pseudobagrus brevianalis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Snout.	Interorbital.	Pectoral.	Ventral.	Length, Mm.
Jitsugetsutan	4	5.33	1, 7	15	1, 7	6	1.32	2.5	2.33	1.75	2.28	130
Dainansho	3.75	4.5	1, 7	15	1.7	6	1.31	2.66	2.43	1.7	2	78

6. *Pseudobagrus taiwanensis* sp. nov. (Plate XLVIII, Fig. 1).

Head 3.875 in length; depth 7.14; D. I, 7; A. 15; P. I, 7; V. 6; width of head 1.4 in its length; snout 2.75 in head; interorbital space 3; eye 8; pectoral 1.55; ventral 2.11.

Body elongate, depth rather uniform, tail compressed; head broad, depressed; snout flattened, bluntly rounded anteriorly; upper jaw projecting beyond the lower; mouth inferior, transverse, crescent-shaped; lips moderately thick, fleshy, lower lip distinct at the angle of the mouth only; jaws with broad bands of villiform teeth; palate with a transverse, crescent-shaped band of villiform teeth; 8 barbels, four on the snout, the other four on the mentum, maxillaries the longest, reaching tip of operculum; nasal barbel as long as median mental; eyes small, laterally superior, covered with thin skin; nostrils separated, the anterior tubular, in contact with posterior margin of the upper lip; posterior nostrils just behind the root of nasal barbel; interorbital space broad, middle part depressed longitudinally; gill-openings large, extending backwards to the base of pectoral; gill-membranes entirely separated; gill-rakers 3 + 10, proximal ones on the lower arm minute.

Origin of the dorsal in advance of the tip of pectoral, with a sharp spine; adipose dorsal very short and low, originating behind the base of anal, much shorter than the latter, and ending in front of the tip of the anal; pectoral fin rather elongate, armed with a sharp spine, its inner edge strongly denticulated; ventral fin scarcely reaching the base of anal, overlapping anus and the well-developed anal papilla; anal fin rather short; caudal fin slightly emarginate, the tip of each lobe rounded; caudal peduncle elongate, deeper posteriorly, its depth about twice in the length of head.

Body smooth; lateral line continuous, nearly straight, extending along the middle of the sides.

Color in formalin uniformly dark brown, belly and lower part of head whitish.

Total length 152 mm.

Described from a specimen from Tozen River near Taichu, collected by T. Aoki in December, 1916.

Habitat: Tozen River; Taito River; Shinchiku.

Remarks: The nearest relative of the present-species is *Pseudobagrus brevianalis* Regan. These two species differ as follows:

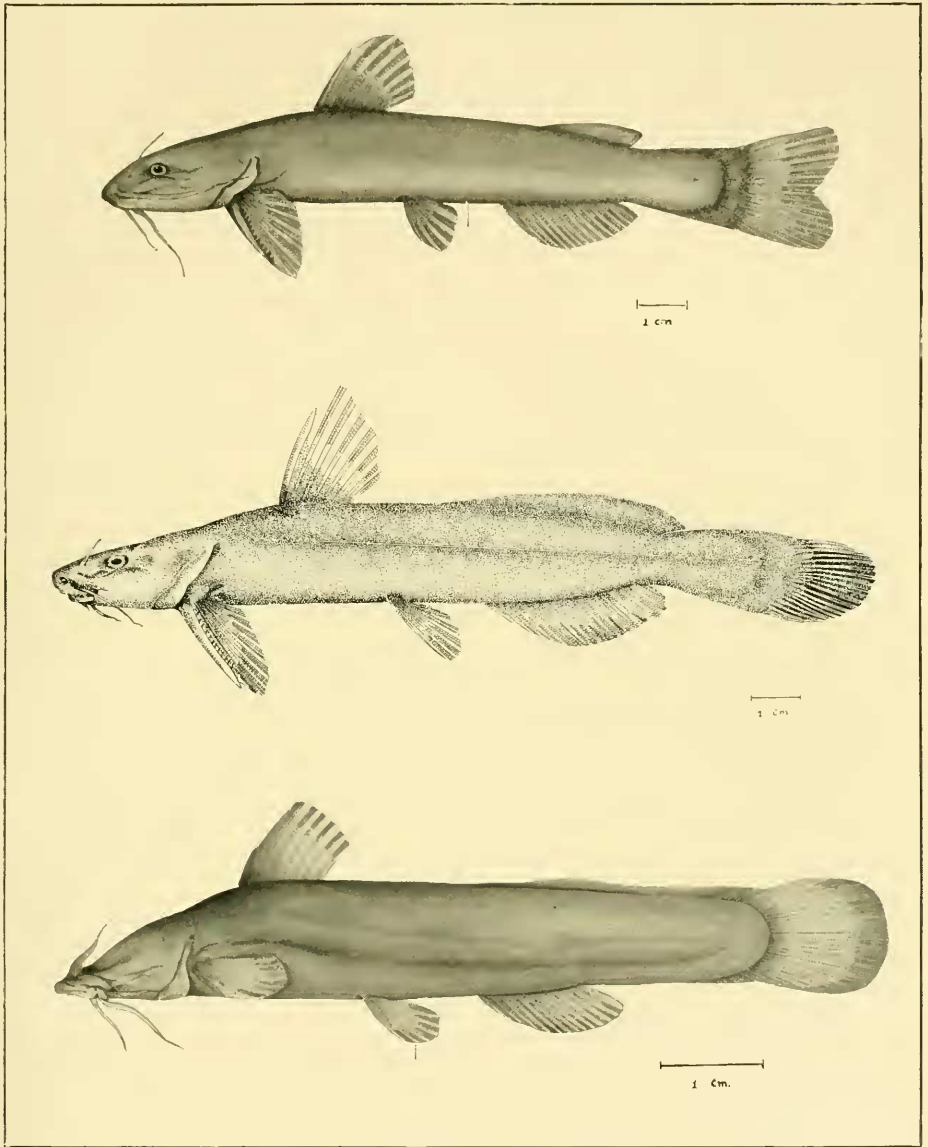


FIG. 1. *Pseudobagrus taiwanensis* Oshima, sp. nov.
FIG. 2. *Pseudobagrus adiposalis* Oshima, sp. nov.
FIG. 3. *Diobagrus nantoënsis* Oshima, sp. nov.



- a'*. Depth of body 6.42 to 7.14; maxillary barbels long, reaching the tip of operculum; adipose dorsal shorter than the anal; origin of the dorsal in advance of the tip of pectoral..... *taiwanensis*.
a''. Depth of body 4.5 to 5.33; maxillary barbel short, reaching only to the base of the pectoral; adipose dorsal longer than the anal; origin of the dorsal above the tip of pectoral..... *brevianalis*.

MEASUREMENTS OF *Pseudobagrus taiwanensis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Snout.	Interorbital.	Eye.	Length, Mm.
Tozen River.....	3.87	7.14	1, 7	15	1, 7	6	1.40	2.75	3	8.	152
Shinchiku.....	3.58	6.83	1, 7	15	1, 7	6	1.33	2.60	3	8.	52
Daito River.....	3.91	6.42	1, 6	15	1, 7	6	1.33	2.75	3	7.5	50

7. *Pseudobagrus adiposalis* sp. nov. (Plate XLVIII, Fig. 2).

Sankakufu (Formosa).

Head 4.28 in length; depth 7.16; D. I, 7; A. 19; P. I, 8; V. 6; width of head 1.5 in its length; interorbital space three times in head; snout 2.8; width of mouth 2.5; pectoral 1.33; ventral 1.86; eye eight times in head; three times in interorbital space.

Body elongate, depth rather uniform, tail compressed; head broad, triangular, depressed and smooth; snout flattened, obtusely rounded anteriorly, projecting beyond the lower jaw; mouth inferior, transverse, crescent-shaped; lips thick, more or less papillose; jaws with broad bands of villiform teeth; eyes small, lateral and superior, covered with thin skin; nostrils separated, the anterior tubular, in a shallow pit behind the upper lip, the posterior in contact with the root of the nasal barbel; eight barbels, four on the snout, the other four on the mentum, the maxillary barbels the longest, reaching beyond the posterior margin of orbit, the median mental barbels the shortest; interorbital space broad, somewhat elevated; gill-openings large, reaching upward beyond the base of pectoral; gill-membranes deeply notched, entirely separated from each other; gill-rakers 3 + 10; slender.

Dorsal fin inserted on anterior third of the distance between tip of snout and base of caudal, armed with a sharp spine; adipose dorsal very long, inserted behind the base of ventral, reaching beyond the posterior end of base of anal, its height gradually increasing posteriorly; the pectoral with a strong spine which is strongly serrated behind;

ventral fin broad, entirely behind the dorsal, reaching the anal papilla; anal fin well-developed, shorter than the adipose dorsal, inserted behind the origin of the latter, elongate and higher in front; caudal fin slightly diverging posteriorly, its tip very slightly emarginate; caudal peduncle much compressed, deeper posteriorly; depth twice in head.

Body smooth; lateral line continuous, straight, extending along the middle of the sides.

Color in formalin dark reddish gray, darker above, paler below; lower parts whitish.

Total length 172 mm.

Described from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1915.

Habitat: Tamusui River; Taito River; Sobun River.

Remarks: The present species is closely related to *Pseudobagrus aurantiacus*¹ from Japan. The specific differences may be expressed as follows:

- a'*. Anal fin 20-22-rayed; pectoral I, 7; gill-rakers 3 + 7; the dorsal inserted above tip of pectoral; adipose dorsal shorter than the anal; maxillary barbel long, reaching the tip of operculum. *aurantiacus*.
- aa''*. Anal fin 18-19-rayed; pectoral I, 8 or I, 9; gill-rakers 3 + 10; origin of the dorsal in advance of the tip of pectoral; adipose dorsal much longer than the anal; maxillary barbel short, not reaching the base of pectoral. *adiposalis*.

MEASUREMENTS OF *Pseudobagrus adiposalis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout	Eye.	Length, Mm.
Tamusui River.	4.5	7	I, 7	18	I, 9	6	1.4	3	3	6.5	165
Tamusui River.	4.28	7.16	I, 7	19	I, 8	6	1.5	3	2.8	8	172
Tamusui River.	4.16	7	I, 7	18	I, 9	6	1.4	3	3	7	147
Tamusui River.	4.25	6.6	I, 7	19	I, 9	6	1.75	3	3	7	190
Tamusui River.	4.5	7	I, 7	19	I, 9	6	1.43	3	3	6	160
Heirinbi.	4.26	6.74	I, 7	19	I, 8	6	1.43	3	2.58	6	141
Sobun River.	4.42	7	I, 7	18	I, 9	6	1.33	3	3	9	310

GENUS *LIOBAGRUS* Hilgendorf.

1878. *Liobagrus* HILGENDORF, Sitzungs. Gesellsch. Freund. Berlin, p. 1. (Type *Liobagrus reinii* Hilgendorf.)

Body elongate, with compressed tail and rounded caudal. Head broad and depressed; top of head smooth, the humeral process smooth;

¹ *Bagrus aurantiacus* Temminck & Schlegel, Fauna Japonica, Poiss., 1846, p. 227, Pl. CIV, Fig. 2; Japan.

Pseudobagrus aurantiacus Bleeker, Act. Soc. Sci. Indo-Nerl., VIII, 1860, p. 85.

eyes small and covered with thin skin, anterior in position; snout broad, obtuse, and projecting; teeth in jaws only, in broad villiform bands; eight barbels, the median mental barbels widely separated. Dorsal fin placed anteriorly; dorsal and pectoral spines smooth, sharp, and imbedded in skin; adipose fin long and low, joined to the caudal as in *Notrius*; ventral fins small, not reaching the anal, which has fifteen rays (Jordan & Fowler).

Distribution: Formosa; China; Corea; Japan.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a. Dorsal fin with seven soft rays; anal with twelve; upper jaw slightly longer than the lower..... *nantoënsis*.
- aa. Dorsal fin with five soft rays; anal with fifteen; jaws equal anteriorly.
formosanus.

8. *Liobagrus nantoënsis* sp. nov. (Plate XLVIII, Fig. 3).

Head 4.33 in length; depth 6; D. I, 6; A. 12; P. I, 7; V. 6; width of head once in its length; snout three times in head; interorbital space 2.5; pectoral 1.25; ventral 1.8.

Body compressed, dorsal profile abruptly inclined anteriorly at the base of dorsal fin; head large, round, flattened, with a median shallow groove, both sides of which are slightly swollen; interorbital space depressed; snout very short, anterior margin broadly rounded, projecting beyond lower jaw; mouth anterior, transverse, with thick fleshy lips; upper jaw with a band of villiform teeth, similar bands on the lower jaw, crescent-shaped, narrower, but longer than that of upper jaw; no teeth on palatine and vomer; eight barbels, four on snout, others on mentum, all barbels thick at the base, nasal barbel nearly as long as inner mental, maxillary barbels slightly shorter than outer mentals, scarcely reaching the base of pectoral; nostrils superior, separated, anterior nostril in a short tube, the posterior in contact with root of nasal barbel; eyes very small, superior, imbedded in skin; gill-openings rather large; gill-membranes entirely separated.

Dorsal fin small, its spine nearly half as high as the fin, hidden beneath skin; adipose dorsal low and long, opposite to the anal; pectoral armed with a sharp smooth spine, which is hidden beneath the skin, tip of the fin reaching beyond the middle of dorsal; ventral fin entirely behind the dorsal, reaching beyond anus; the anal much shorter than adipose dorsal; caudal fin rather long, its tip rounded; depth of caudal peduncle uniform. Body smooth; lateral line indistinct. Color in formalin brownish gray, fins somewhat paler.

Total length 88 mm.

Described from a specimen from Dainansho, Nanto, collected by T. Aoki in December, 1916.

Habitat: Dainansho, Nanto.

Remarks: The present species differs from *Liobagrus formosanus* Regan from Lake Candidius in having a 7-rayed dorsal, a 12-rayed anal, and a slightly protruded upper jaw.

MEASUREMENTS OF *Liobagrus nantoënsis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Length. Mm.
Dainansho.	4.33	6	I, 7	12	I, 7	6	1	2.5	3	11	88
Dainansho.	4.50	5.61	I, 7	12	I, 7	6	1.23	2.66	3	10	48

9. *Liobagrus formosanus* Regan.

1908. *Liobagrus formosanus* REGAN, Ann. Mag. Nat. Hist. (8), 11, p. 360; Lake Candidius, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 168; Lake Candidius (after Regan).

Depth of body six times in the length, length of head 4.33. Head a little longer than broad; interocular width nearly three times in the length of head. Jaws equal anteriorly; premaxillary band of teeth apparently two and one-half times as long as broad; posterior mandibular barbel extending to basal part of pectoral. Dorsal I, 5; spine one-fourth the length of head. Pectoral spine half the length of the fin, which is eight-tenths the length of the head. Anal 15. Caudal rounded. Grayish; fins dusky; anal and caudal with a narrow pale edge.

A single specimen, 37 mm. in total length; Lake Candidius, Formosa (Regan).

Habitat: Jitsugetsutan (Lake Candidius). Not seen.

Remarks: According to Regan the present species is closely related to *Liobagrus andersoni* Regan² from Corea.

Genus CLARIAS Gronovius.

1763. *Clarias* GRONOVIVS, Zoöphyl., p. 100 (non binomial).

1777. *Clarias* SCOPOLI, Intr. Hist. Nat., p. 455. (Type *Clarias orontis* Günther.)

1803. *Macropteronotus* LACÉPÈDE, Hist. Nat. Poiss., V, p. 84. (Type *Macropteronotus charmuth* Lacépède.)

Adipose fin none; dorsal long, extending from the nape to the

² *Liobagrus andersoni* Regan, Proc. Zoöl. Soc. London, 1908, p. 61; Kimhoa, Corea.

caudal; anal long. Jaws with a band of villiform teeth; a band of villiform or granular teeth across the vomer; cleft of mouth transverse, anterior, of moderate width; barbels eight, one pair of nasal, one of maxillary, and two pairs of mandibular barbels. Eyes small, with a free orbital margin. The upper and lateral parts of the head are osseous, or covered with only a very thin skin. A dendritic, accessory branchial organ is attached to the convex side of the second and fourth branchial arches, and received in a cavity behind the gill-cavity proper. Ventrals six-rayed; only the pectoral has a pungent spine.

Distribution: Africa; Syria; Bengal; India; Sumatra; Java; Borneo; Ceylon; Luzon; Mindanao; Formosa; China; Cochin-China.

10. *Clarias fuscus* (Lacépède).

Tosa or Tause (Formosa).

1803. *Macropteronotus fuscus* LACÉPÈDE, Hist. Nat. Poiss., V, p. 88, pl. 2, fig. 2.
 1846. *Clarias pulcaris* RICHARDSON, Voy. Sulph., Fish., p. 135, pl. 62, fig. 56; Canton, China.
 1864. *Clarias fuscus* GÜNTHER, Cat. Fish., V, p. 18; China.—Jordan & Evermann, Proc. U. S. Nat. Mus., XXV, 1903, p. 321; Taihoku, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 168; Taihoku; Takao.—VAILLANT, Bull. Mus. Hist. Nat., VI, 1904, p. 297; Tongking.
 1897. *Clarias fuscus* RUTTER, Proc. Acad. Nat. Sc. Philad., Jan., p. 57; Swatow, China.
 1908. *Clarias sauteri* REGAN, Ann. Mag. Nat. Hist. (8), I, p. 151; Kagi; Formosa.

Head 4.11 in length; depth 5.66; D. 58; A. 42; P. I, 9; V. 6; width of head 1.2 in its length; eye twelve times in head, five times in snout, six and one-half times in interorbital space, which is contained 1.75 in head; pectoral 1.33; ventral 2.66.

Body compressed, higher in front; head flattened, inclined anteriorly, with two oval depressions along the median longitudinal line, one on the interorbital space, the other on occiput; tail long and tapering; snout flattened, truncated in front; mouth slightly inferior, transverse; lips granulated, upper lip much thicker than the lower; jaws with a band of villiform teeth, upper jaw protruding; vomer with a crescent-shaped band of villiform teeth, which is narrower than that of the intermaxillary; eyes very small, supra-lateral; nostrils separated, anterior nostril in contact with upper lip, in a short tube, posterior nostril superior, just behind the base of rostral barbel; eight barbels, one pair rostral, one maxillary, two mandibular, of which the maxillary

pair are the longest, about 1.2 in the length of head; gill-openings low; gill-membranes entirely separated; gill-rakers 4 + 14, slender and pointed.

Dorsal fin very long, originating at anterior third of body without caudal, extending posteriorly to the base of the caudal; anal fin long, inserted slightly posterior to a point midway between tip of snout and base of caudal; pectoral fin armed with a strong, short spine, which has a fine serration below the skin; the ventral very small, its tip reaching beyond base of anal fin; caudal fin separated from the dorsal and anal; rather long, the tip rounded.

Body naked, with numerous undulating vertical striations on the sides; lateral line descends a little at the commencement and runs straight at mid-height.

Color in formalin uniformly dark brown, lower parts whitish; sides with about eight vertical rows of minute white spots, descending from the back to the lateral line, and two or more longitudinal rows of the same below the lateral line.

Total length 192 mm.

The present description from a specimen from Jitsugetsutan, collected by T. Aoki, in August, 1916.

Habitat: Very common in the fresh waters of Formosa. My specimens came from Jitsugetsutan (Lake Candidius); Taihoku; Tamusui River near Shinten; Maruyama near Taihoku; Giran.

MEASUREMENTS OF *Clarias fuscus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Length. Mm.
Jitsugetsutan	4.11	5.66	58	42	1, 9	6	1.20	2	3	12	192
Jitsugetsutan	4.28	5.45	55	36	1, 9	6	1.16	1.75	2.33	10	100
Maruyama	4.44	5.83	54	35	1, 9	6	1.14	1.83	2.28	11.66	162
Maruyama	4.35	5.32	53	41	1, 9	6	1.12	1.86	2.36	10.33	132
Maruyama	4.09	6	52	39	1, 9	6	1.20	2	2.55	10	110
Giran	4.27	5.50	55	40	1, 9	6	1.60	1.8	2.50	10.33	218

Remarks: In the year 1908, Mr. C. Tate Regan described a new catfish from Kagi, Formosa, giving it the name *Clarias sauteri*, and made the following statement: "*C. sauteri* is close to the Chinese *C. fuscus* Lacépède, which differs notably in having villiform teeth on the palate." It is observed, however, that large specimens of *C. fuscus* are provided with more or less enlarged vomerine teeth,

instead of being villiform, as in small specimens. Thus the size of the vomerine teeth is an individual difference, not specific. Therefore it is unreasonable to separate *C. sauteri* from *C. fuscus*.

Family COBITIDÆ.

ARTIFICIAL KEY TO THE FORMOSAN GENERA.

- a. No erectile spines below the eye; ten or twelve barbels; four about the mandible; lateral line medium.....*Misgurnus*.
- aa. An erectile spine below the eye; six barbels, only on the upper jaw; lateral line incomplete.....*Cobitis*.

Genus MISGURNUS Lacépède.

1803. *Misgurnus* LACÉPÈDE, Hist. Nat. Poiss., p. 16. (Type *Cobitis fossilis* Linnæus.)

Body elongate, compressed. Head triangular, elongate, compressed; snout projecting; mouth inferior, with fleshy lips; barbels ten or twelve, of which four are mandibular; eye small. Gill-openings lateral; lateral line complete. No spine below the eye. Body with small scales, except on the head, which is naked. Origin of the dorsal about in the middle of the length of the fish, over the ventrals; anal entirely behind dorsal; pectorals more or less equal to the head; caudal nearly equal to head, and rounded. Air-bladder in a bony capsule (Jordan & Fowler).

Distribution: Europe; Bengal; India; Siam; Indo-China; China; Formosa; Amur Province; Japan.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a. Scales relatively small, 140-150 in lateral series; body slender, the depth 7-8 in length; barbels short, the longest, about 2.5 in head; color dark gray, above spotted and marbled with dark, base of the caudal above with a black spot.
anguillicaudatus.
- aa. Scales relatively large, 106-115 in lateral series; body plump, the depth 5.86-6.50 in length; barbels long, the longest about 1.8 in head; color relatively plain, obtusely speckled with minute dark spots, not marbled, base of the caudal above with no black spot.....*decemcirrosus*.

11. *Misgurnus anguillicaudatus* (Cantor).

Dojo (Japan); Horyu (Formosa).

- 1842. *Cobitis anguillicaudatus* CANTOR, Ann. Mag. Nat. Hist. IX, p. 485.—RICHARDSON, Voy. Sulph., Fish., 1846, p. 143, Pl. 55, Figs. 9 and 10; China.
- 1868. *Misgurnus anguillicaudatus* GÜNTHER, Cat. Fish. VII, p. 345; China; Japan; Formosa.—Ann. Mag. Nat. Hist., Sept., 1873, p. 250; Shanghai.—

- PETERS, *Monatb. Königl. Akad. Berlin*, 1880, p. 926.—SAUVAGE, *Nouv. Arch. Mus.*, 1881, p. 190.—GÜNTHER, *Ann. Mus. St. Petersburg*, 1896, p. 19; Kansu; China.—RÜTTER, *Proc. Acad. Nat. Sc. Philad.*, 1897, p. 60; Swatow.—FOWLER, *Proc. Acad. Nat. Sc. Philad.*, 1899, p. 179; Tan-lan-ho, China.—JORDAN & SNYDER, *Proc. U. S. Nat. Mus.*, XXIII, 1901, p. 340; Japan.—REGAN, *Ann. Mag. Nat. Hist.* (7), XIII, 1904, p. 192; Yunnan-Fu, China.—VAILLANT, *Bull. Mus. Hist. Nat.*, 1904, VI, p. 298; Tongking.—JORDAN & SNYDER, *Proc. U. S. Nat. Mus.*, XXX, 1906, p. 834; Japan.—SNYDER, *Proc. U. S. Nat. Mus.*, XLII, 1912, p. 404; Hakodate; Tokyo; Takamatsu River.—JORDAN, SNYDER, & TANAKA, *Journ. Coll. Sci. Tokyo*, XXXIII, 1913, p. 60; Japan.
1846. *Cobitis maculata* TEMMINCK & SCHLEGEL, *Fauna Japonica*, Poiss., p. 221, Pl. CIII, Fig. 2; near Nagasaki.
1846. *Cobitis rubripinnis* TEMMINCK & SCHLEGEL, *Fauna Japonica*, Poiss., p. 220, Pl. CIII, Fig. 1; near Nagasaki.
1846. *Cobitis micropus* CUV. & VAL., *Hist. Nat. Poiss.*, XVIII, p. 29, China.
1846. *Cobitis psammisus* RICHARDSON, *Ichthyol. China*, p. 300; Canton, China.
1860. *Cobitichthys enalios* BLEEKER, *Act. Soc. Indo-Neerl.*, VIII; Japan.—IV, p. 88, Pl. II, Fig. 4; Japan.
1860. *Cobitichthys dechachraus* BLEEKER, *Act. Soc. Sci. Indo-Neerl.*, VIII; Japan.—IV, p. 89, Pl. II, Fig. 2; Tokyo.
1868. *Misgurnus dechachraus* GÜNTHER, *Cat. Fish.*, VII, p. 346; Tokyo.
1878. *Misgurnus crossochilus* SAUVAGE, *Bull. Sc. Philom.*, Jan., p. 4; Koaton, CochinChina.
1907. *Misgurnus fossilis anguillicaudatus* BERG, *Proc. U. S. Nat. Mus.*, XXXII, p. 435; Amur Province.

Head 6 in length; depth 7; D. 9; A. 7; P. I, 9; V. 6; width of head 2 in its length; eye 3 in snout, 1.66 in interorbital space; snout 2.5 in head; pectoral 1.6; ventrals 2; scales about 140.

Body elongate, compressed; head small, triangular, compressed; snout rather long, obtuse, somewhat produced; eyes small, anterior and superior; mouth inferior, with thick fleshy lips; ten barbels, four belonging to the mandible; the longest barbel 2.5 in head; nostrils close together, in front of eye, the anterior in a short tube; interorbital space slightly convex; gill-openings lateral; gill-membranes joined below in front of the base of the pectoral.

Origin of dorsal about midway between tip of snout and tip of caudal, a little in front of the ventral; anal fin entirely behind the dorsal, nearer the origin of the ventral than the base of caudal; pectoral fin short and low; the caudal oblong, broad, rounded, nearly as long as head; caudal peduncle long and deep, its depth about two-thirds of the length of head.

Head naked, trunk covered with small cycloid scales; lateral line extends along the middle of the sides.

Color in formalin dark gray, upper half of the body spotted and marbled with darker; base of the caudal above with a black spot; dorsal and caudal fins with several rows of dark small spots; sides of body with a number of obscure longitudinal black stripes; belly together with pectorals, ventrals, and anal whitish.

Total length 107 mm.

Described from a specimen from Giran, collected on December 2, 1916.

Habitat: Very abundant in all the rivers and rice-fields of the island. My specimens came from the Tamusui River near Taihoku; Maruyama; Giran; Jitsugetsutan (Lake Candidius); Rato and Raupi; Giran.

MEASUREMENTS OF *Misgurnus anguillicaudatus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Min.
Giran.....	6	7	9	7	1, 9	6	2	4.25	2.40	7	140	107
Giran.....	6	6.87	7	6	1, 9	6	1.6	4.33	2.66	8	140	120
Maruyama.....	5.6	7.29	8	7	1, 9	6	1.69	4.80	2.30	9	150	150
Maruyama.....	5.42	7.6	9	7	1, 9	6	1.75	4	2.28	8	148	90
Maruyama.....	5.56	8	8	7	1, 9	6	1.75	4	2.33	8.66	—	90
Maruyama.....	6	7.4	8	6	1, 9	6	1.86	4	2.16	7.33	149	88

12. *Misgurnus decemcirrosus* (Basilewsky).

1855. *Cobitis decemcirrosus* BASILEWSKY, Mem. Soc. Nat. Moscow, p. 239, Pl. 7; near Peking.
1888. *Misgurnus mizolepis* GÜNTHER, Ann. Mag. Nat. Hist., June, p. 434; Kiu-Kiang, China.
1901. *Misgurnus anguillicaudatus* ABBOTT, Proc. U. S. Nat. Mus., XXIII, p. 489; Tientsin, China.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 321; Tiabolu, Formosa.
1906. *Misgurnus decemcirrosus*, JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXX, p. 834; Tientsin, China.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, 1909, p. 169; Formosa.

Head 7 in length; depth 6.2; D. 7; A. 6; P. 1, 9; V. 6; width of head 2.33 in its length; eye 7 in head, 3 in snout; 2 in interorbital space; snout 2.5 in head; pectoral 1.33; ventral 2; scales about 112 in lateral series, 23 in transverse series from origin of dorsal to the ventral.

Body elongate and compressed; head small, triangular, compressed; snout long, pointed and produced; eyes small, superior, and nearer tip of snout than gill-opening; mouth inferior, with thick fleshy lips; ten barbels, four belonging to the mandible, the longest barbel 1.8 in

head; nostrils in front of eye, separated a little, the anterior in a short tube; interorbital space convex, 1.66 in snout; cheeks slightly swollen; gill-openings lateral; gill-membranes joined below in front of the base of the pectoral.

Origin of the dorsal about midway in the length of body including caudal, slightly in front of the origin of ventral; anal fin entirely behind the dorsal, nearer to origin of ventral than base of caudal; caudal squarish, with obtusely rounded tip, nearly as long as head; pectoral fin short and low; the ventral short; caudal peduncle deep and long, its depth about three-fourths the length of head.

Head naked; trunk covered with relatively large cycloid scales; lateral line extends along the middle of the sides.

Color in formalin uniformly dark gray, obscurely speckled with small dark spots, not marbled; dorsal, anal, and caudal fins dusky, with numerous small dark spots; the pectoral and the ventral whitish, some dusky on the longer rays; belly yellowish white.

Total length 145 mm.

The present description is taken from a specimen from the fish-market of Taichu, collected by T. Aoki in December, 1915.

Habitat: Taihoku; Taichu.

Remarks: In the year 1888 Günther recorded a Chinese species of *Misgurnus* under the name of *Misgurnus mizolepis* and stated that it has larger scales than any other species of the genus known to himself. According to his description, the scales of *Misgurnus mizolepis* are arranged in thirteen longitudinal rows between the dorsal fin and the lateral line, and ten between the lateral line and the ventral fin. Scales of *Misgurnus decemcirrosus* are also much larger than any other species of the genus, numbering 112 in the lateral series and 23 in an oblique series from the origin of the dorsal to the ventral. Moreover, as all other characters of that species agree quite well with those of *M. mizolepis*, there is no doubt that these two are the same species.

Though Jordan & Snyder believe that *M. decemcirrosus* from Northern China differs from *M. anguillicaudatus* in having large scales (about 112 in lateral series), rather deep body, long barbels, and relatively plain color, Berg denies that the former is different from the latter. After examining a vast number of specimens of *M. anguillicaudatus* he comes to the conclusion that *M. decemcirrosus* is a nominal species, because there is no difference between Japanese and North Chinese specimens of *M. anguillicaudatus* in respect of the

number of scales and the depth of the body. In addition he asserts: "If we regard the specimens from near Peking as a distinct species we shall be obliged to regard many varieties of the same species found in other parts of China and in Japan also as distinct species, which is inadmissible in consequence of the known variability of *anguillicaudatus*."

It is certain that there is no specific difference between Chinese and Japanese *M. anguillicaudatus*; however, it is also true that in China and Formosa there exists a large-scaled species of *Misgurnus* (Basilewsky's *Cobitis decemcirrosus* or Günther's *Misgurnus mizolepis*) which is distinctly separate from common *M. anguillicaudatus*. According to Berg's statement all the specimens of *Misgurnus* which were examined by him belonged to *M. anguillicaudatus*, not *M. decemcirrosus*, differing in having more than 145 scales in the lateral series. Not only is the large-scaled *Misgurnus decemcirrosus* not a nominal species, but it is proved that it is distributed in Northern and Southern China as well as in Formosa, distinctly differing from the common loach, *Misgurnus anguillicaudatus*. Therefore Berg's opinion with reference to *M. decemcirrosus* is incorrect.

MEASUREMENTS OF *Misgurnus decemcirrosus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Inferior-bital.	Snout.	Eye.	Scales.	Length, Mm.
Taichu.....	6.5	6.2	7	6	I, 9	6	2.33	3.6	2.50	7	112	145
Taichu.....	6	5.86	7	6	I, 9	6	2	3.6	2.25	7.33	112	123
Taihoku.....	6	6.5	7	6	I, 9	6	1.88	3.75	2.66	6	115	108
Taihoku.....	6	6.2	7	6	I, 10	6	2	4	2.50	7	106	100
Taihoku.....	6	6.2	7	6	I, 10	6	1.86	4	2.60	6	106	98
Taihoku.....	6	6	7	6	I, 10	6	2	4	2.50	7	110	105
Taihoku.....	6	6.5	7	6	I, 10	6	1.88	3.66	2.60	6	112	105

Genus COBITIS Linnæus.

- 1738. *Cobitis* ARTEDI, Genera (non binomial).
- 1758. *Cobitis* LINNÆUS, Syst. Nat., Ed X, p. 303. (Type *Cobitis tania* Linnæus.)
- 1835. *Acanthopsis* AGASSIZ, Mem. Soc. Sci. Nat. Neuchatel, I, p. 36. (Type *Cobitis tania* Linnæus.)

Body elongate, more or less compressed, and the trunk not arched. Head elongate, compressed; eyes small; snout produced, blunt and rounded; mouth small, inferior, and with six barbels about the upper jaw; below the eye an erectile bifid spine. Dorsal fin about over the ventrals; anal behind dorsal; caudal rounded or truncate; pectorals

less than the head; ventrals below dorsal. Air-bladder inclosed in a bony capsule. Lateral line incomplete. Small fresh-water fishes of Europe and Asia (Jordan & Fowler).

Distribution: Europe; Assam; Bengal; China; Formosa; Corea; Amur province; Japan.

13. *Cobitis tænia* Linnæus.

1758. *Cobitis tænia* LINNÆUS, Syst. Nat. Ed. X., p. 303; Europe.—GÜNTHER, Cat. Fish., VII, 1868, p. 362; Europe; Japan.—JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, 1903, p. 771; Japan.
1846. *Cobitis tænia japonica* SCHLEGEL, Fauna Japonica, Poiss., p. 222, Pl. CIII, Fig. 2; near Nagasaki,
1875. *Cobitis sinensis* SAUVAGE & DE THIERSANT, Ann. Sci. Nat., Ser. 6, I, p. 8; Setchuan, China.—FOWLER, Proc. Acad. Nat. Sci. Philad., 1899, p. 182; Tan-lan-ho, China.—JORDAN & METZ, Mem. Carneg. Mus., VI, 1913, p. 12; Suigen; Gensan; Fusan, Corea.
1901. *Cobitis biwæ* JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, p. 748; Lake Biwa (substitute for *Cobitis japonica* pre-occupied).—JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 62; Japan.

Head 5 in length; depth 6.166; D. 8; A. 7; P. 10; V. 7; width of head a little over two in its length; snout two times in head; inter-orbital space 5.33; eye 5.5; pectoral 1.5; ventral 1.66.

Body elongate and compressed; head elongate, strongly compressed, with convex upper profile; snout long, somewhat produced, anterior border bluntly rounded; eyes small, superior and lateral, located midway between tip of snout and gill-opening; mouth small, inferior, with fleshy lips, the lower bilobed; eight barbels, two of which are mandibular; nostrils nearer the eye than the tip of snout, close together, the anterior in a short tube; interorbital space narrow; gill-openings large, lateral; gill-membranes united below the base of the pectoral in front.

Origin of dorsal nearer the base of caudal than the tip of snout, somewhat in advance of ventral, length of dorsal when depressed a little less than the length of head; pectoral a little longer than one-third the distance between its base and origin of ventral; ventral twice in the space between its origin and that of the ventral; anal fin entirely behind the dorsal, reaching two-thirds of the space between its origin and the base of caudal; caudal peduncle compressed, its depth slightly less than twice in head.

Head naked, trunk covered with very small cycloid scales; lateral line very short, extending a little beyond the middle of the pectoral.

Color in formalin pale grey above, lower parts and belly yellowish white; sides with two rows of dark blotches, the upper one forming a continuous longitudinal band anteriorly, blotches of the lower row larger; between the two rows a narrow paler marbled brown streak, occupying the anterior half the interspace; eight blotches of dark brown between the nape and the origin of the dorsal, seven more between the latter and the base of the caudal; base of the caudal above with a jet-black spot; dorsal and caudal fins with several rows of dark small spots; other fins whitish; head marbled and spotted with brown above; back with mottlings; a black streak from eye to snout.

Total Length 122 mm.

Described from a specimen from Shinchiku, collected by T. Aoki on September 17, 1916.

Habitat: Shinchiku; Jitsugetsutan (Lake Candidius); Rigyokutsu, Nanto; Maruyama, Giran.

*Remarks:*The markings of the present species are more or less variable. The other example from Shinchiku has the brown blotches on the sides distinctly separated into spots, while the example from Rigyokutsu has the upper blotches on the sides merged into continuous longitudinal bands.

MEASUREMENTS OF *Cobitis tania*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Length. Min.
Shinchiku.....	5	6.16	8	7	10	7	2.75	6.75	2	5.33	122
Shinchiku.....	5	6.18	8	7	10	7	2.80	6	2	5.66	82
Jitsugetsutan.....	5	7.50	8	6	10	7	2.60	6	2	5	82
Rigyokutsu.....	5	6.88	8	6	10	7	2.60	6	2	5	67

Family HOMALOPTERID.E.

ARTIFICIAL KEY TO THE FORMOSAN GENERA.

- a. Body elongate, rather high, anterior part depressed; mouth inferior; upper lip fleshy, with a distinct inner fold; barbels numerous, one pair of maxillary, two transverse series of minute ones on upper jaw, and three pairs on the lower jaw; dorsal fin inserted in advance of the ventral; pectoral with one simple outer ray, horizontal.....*Formosania*.
- aa. Body much depressed, nearly twice as broad as high; mouth inferior, with fringed upper lip; six barbels, two pairs on the extremity of the snout, the other at the angle of mouth, minute and subequal; dorsal fin inserted behind the origin of the ventral; pectoral with eleven simple outer rays, subhorizontal.

Hemimyzon.

Genus FORMOSANIA gen. nov.

Type *Formosania gilberti* Oshima.

Body elongate, rather high, anterior part depressed; snout spatulate; mouth inferior; upper lip fleshy, with a distinct inner fold; lower jaw with a sharp horny edge; barbels numerous, inferior, upper jaw with two transverse rows of minute barbels and one pair of thick maxillary barbels, lower jaw with three pairs of small barbels; scales minute; lateral line continuous; dorsal fin high, inserted in front of the origin of the ventral; pectoral fin large, not reaching the ventral; the anal large, when depressed reaching the root of caudal; pectoral and ventral fins horizontal, one outer ray simple.

Remarks: Well distinguished from other genera of the *Homalopteridae* by the presence of numerous barbels, especially by the rostral barbels which are arranged in two series.

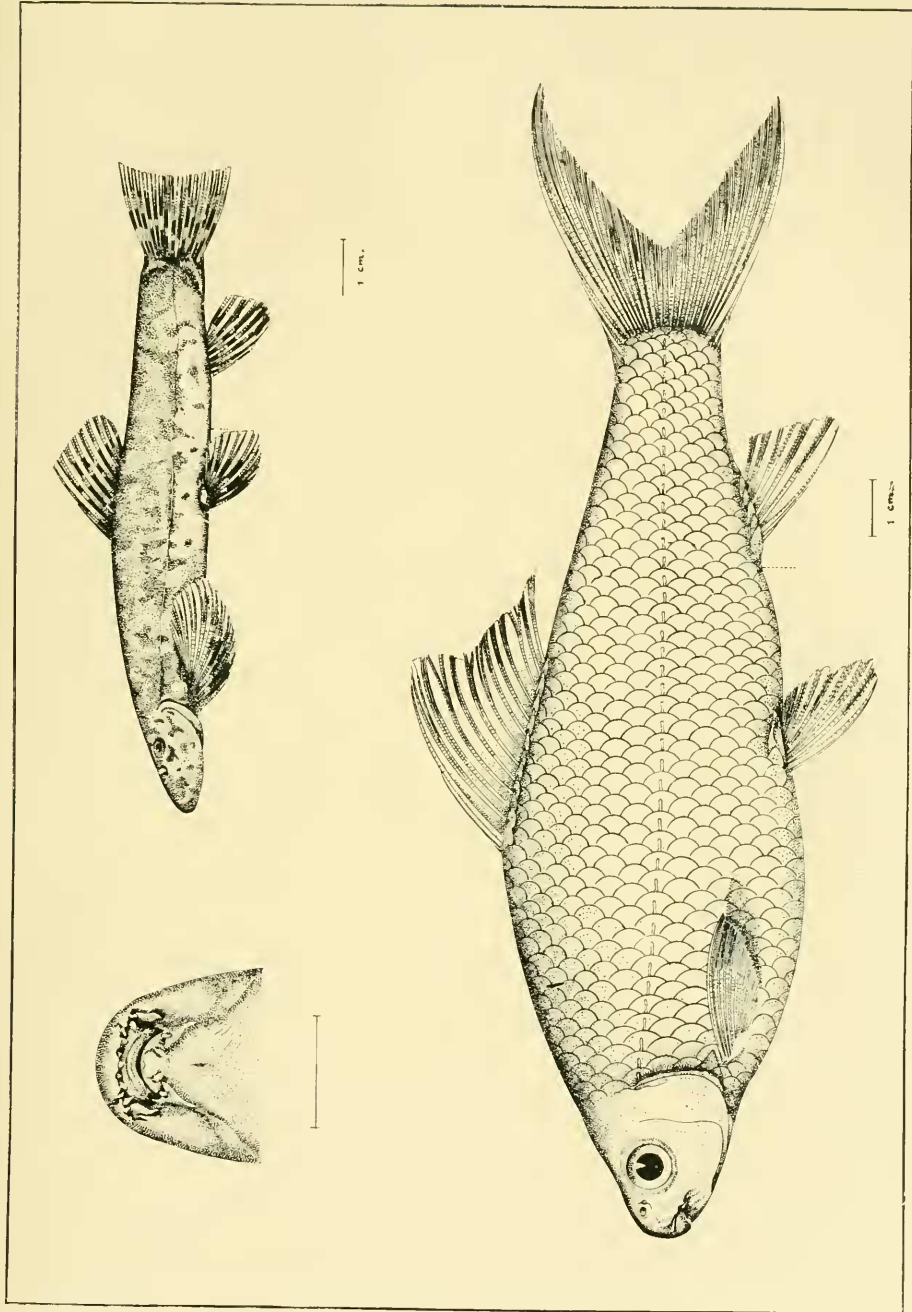
Distribution: Formosa and China.

14. *Formosania gilberti* sp. nov. (Plate XLIX, Figs. 1-2).

Head 4.66 in length; depth 6.2; D. 2.8; A. 2, 5; P. 15; V. 9; width of head 1.22 in its length; eye 6 in head; interorbital space 2.63; snout 1.75; ventral 1.31; pectoral longer than head; scales about 120 in the lateral line.

Body elongate, lower surface flat, tail compressed, cross-section of body triangular, anterior part feebly depressed; head moderate, top nearly flat; snout spatulate, much longer than postocular part, shorter than width, anterior margin broadly rounded; skin of the snout extending to the lower surface, but not overlapping upper lip; mouth inferior, transverse; upper lip thick and fleshy, with a distinct inner fold; lower jaw much shorter than the upper, anterior margin rounded, horny; mentum with a broad fleshy tubercle, the tip of which is bilobed; barbels numerous, inferior, rostral barbels minute, arranged in two transverse rows, each with about five barbels, maxillary pair thick and longest, lower jaw with six barbels, posterior mental pair the longest, the others short and tubercle-like; eyes small, supra-lateral, posterior, nearer angle of gill-cover than tip of snout; nostrils close together, in front of eye; boundary between head and trunk distinct, occiput pointed posteriorly.

Origin of dorsal nearer tip of snout than base of caudal, in advance of that of the ventral, rather high, the anterior ray longest; pectoral horizontal, flattened, large, outer margin broadly rounded, not



Formosania gilberti, Oshima, sp. nov. ventral view of snout, *Do*. lateral view.
Labeco jordani Oshima, sp. nov.

reaching the ventral, one outer ray undivided; ventral inserted beneath the middle of base of dorsal, ovoid, middle ray the longest; anal fin large, when depressed scarcely reaching the root of caudal; caudal fin elongate, weakly emarginate, each lobe sharply pointed.

Body covered with minute scales, head and lower surface naked; lateral line nearly straight, extending along the middle of the sides.

Color in formalin dark yellow, mottled with irregular dark brown blotches, lower surface white; head uniformly dark, with few yellowish markings; fin-rays of the dorsal with elongate black spots; caudal fin with a number of black cross-bars; other fins dusky, with numerous dark spots.

Total length 117 mm.

The present description is from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1916.

Habitat: Tamusui River (four specimens).

Remarks: The present species is very closely related to Boulenger's *Homaloptera stenosoma* (misprinted *Homalosoma*) from Ningpo, China (Proc. Zoöl. Soc. London, March, 1901, p. 270), which seems to belong to the genus *Formosania*. The latter differs from *F. gilberti* in having seven-branched dorsal rays, a smaller number of scales in the lateral line, and slightly shorter head and pectorals.

MEASUREMENTS OF *Formosania gilberti*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length. Mm.
Tamusui River . . .	4.66	6.2	2.8	2.5	15	9	1.22	2.625	1.75	6	120	117
Tamusui River . . .	4.72	5.36	2.8	2.5	16	9	1.21	2.666	1.60	6	130	90

Genus HEMIMYZON Regan.

1911. *Hemimyzon* Regan. Ann. Mag. Nat. Hist. (8), p. 31. (Type *Homaloptera formosanus* Boulenger.)

Body much depressed, nearly twice as broad as high; head disc-shaped, flattened; snout broad, with sharp anterior margin; mouth inferior, transverse, with fringed upper lip; edge of the lower jaw sharp, horny; six barbels, inferior, two pairs on the extremity of the snout, the others at the angle of mouth, minute and subequal; origin of ventral in advance of that of dorsal; the pectoral subhorizontal, eleven outer rays simple; ventral fin horizontal, four outer rays simple;

the anal minute, not reaching the caudal; scales minute; lateral line nearly straight, continuous.

Distribution: Formosa.

15. **Hemimyzon formosanus** (Boulenger).

1894. *Homaloptera formosanus* BOULENGER, Ann. Mag. Nat. Hist., Ser. 6, XIV, p. 463; Central Formosa.

1911. *Hemimyzon formosanus* REGAN, Ann. Mag. Nat. Hist. (8), VIII, p. 32; Formosa (after Boulenger).

Head 4.25 in length; depth 6 in length and 1.5 in width; D. 2, 7; A. 1, 5; P. 22; V. 15; width of head 1 in its length; eye 5.66 in head; snout 1.71; interorbital space 2.3; pectoral 1.33 times as long as head; ventral very slightly shorter than the pectoral; scales about 70 in the lateral line.

Body strongly depressed, low, tail compressed, middle part of body broadest, belly and throat flat; head flattened, disc-shaped; gill-opening rather large; snout broad, with rounded sharp anterior margin; interorbital space rather flat; mouth inferior, transverse, crescent-shaped; upper lip fringed with a fleshy inner fold; lower jaw shorter than the upper; lower lip with a smooth horny inner fold, its anterior margin sharp; six barbels, short, subequal, two pairs on the lower extremity of snout and the other at the angles of mouth; eyes small, superior and posterior, considerably nearer the angle of operculum than tip of snout; nostrils close together, superior, in front of eye, anterior nostril in a short tube.

Origin of the dorsal very slightly nearer tip of snout than base of caudal, above anterior third of the base of ventral; pectoral fin subhorizontal, with eleven simple rays, outer margin broadly rounded, extending beyond the origin of ventral; ventral fins horizontal, flat, distinctly separated, with four simple rays, not reaching the anus; the anal very small, entirely behind the dorsal; caudal fin forked, the tip of each lobe pointed, lower lobe slightly longer than the upper.

Scales minute; belly and throat naked; lateral line nearly straight, slightly upcurved above the pectoral, extending along the middle of the sides.

Color in alcohol dark gray above, lower surface yellowish white; caudal fin with four dark brown cross-bars; other fins provided with a number of dark elongate spots.

Total length 64 mm.

Described from a specimen from Taiko River, collected by T. Aoki in December, 1916.

Habitat: Taiko River (five specimens).

MEASUREMENTS OF *Hemimyzon formosanus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Infero-bital.	Snout.	Eye.	Length. Mm.
Taiko River	4.25	6	2.7	1.5	22	15	1	2.5	1.71	7	64
Taiko River	4	7	2.7	1.5	21	15	1.125	2	1.6	6.5	43

Family CYPRINIDÆ.

ARTIFICIAL KEY TO THE FORMOSAN GENERA.

- I. Anal fin very short, with five or six branched rays.
 - A. Lateral line running along the median line of the tail; dorsal fin opposite to ventrals.
 - a'. Dorsal fin with more than nine branched rays.
 - b'. Pharyngeal teeth in three series, the outer molar-like; barbels two on each side; a strong dorsal spine. *Cyprinus*.
 - b''. Pharyngeal teeth in a single series, barbels none; a strong dorsal spine. *Carassius*.
 - b'''. Pharyngeal teeth in three series, not molar-like; without osseous dorsal rays.
 - Snout more or less swollen; each lip with an inner transverse fold, which is covered with a deciduous horny substance forming a sharp edge; dorsal 13-20. *Labeo*.
 - a''. Dorsal fin with no more than nine branched rays.
 - b'. Pharyngeal teeth in three series.
 - c'. Lower jaw transverse, with a narrow lip which is not continuous, with a sharp inner transverse edge; barbels four. *Acrossocheilus*.
 - c''. Mouth transverse, inferior; lower jaw not covered by lip, with a horny layer inside, rather sharp; barbels two, minute. *Scaphesthes*.
 - c'''. Mouth arched, without inner fold or other peculiarities; lips fleshy.
 - d'. A recumbent spine in front of the dorsal; barbels four. *Spinibarbus*.
 - d''. No recumbent spine; barbels four, or two, or none.
 - e'. Head with mucous cavities; scales large; lips thick; barbels two. *Hemibarbus*.
 - e''. Head without mucous cavities; scales moderate; lips thin.
 - f'. Barbels four. *Barbodes*.
 - f''. Barbels two. *Capaeta*.
 - f'''. Barbels none. *Puntius*.

- b''*. Pharyngeal teeth in two series.
- c'*. Lips thin; mouth terminal, oblique; dorsal nearly over the ventral. *Gnathopogon*.
- c''*. Lips broad and papillose; mouth small, protracted downwards; dorsal inserted well in advance of the ventral. *Pseudogobio*.
- b'''*. Pharyngeal teeth in a single series.
- c'*. Mouth very small, transverse, directed upwards; mandible with a hard, trenchant edge, no barbels. *Pseudorasbora*.
- B. Lateral line running along the lower half of the tail; dorsal fin inserted behind the origin of ventrals.
- a'*. Pharyngeal teeth in two series, 4, 4-4, 4; lateral line complete. *Pararasbora*.
- II. Anal fin short or of moderate length, with from seven to eleven branched rays, not extending forwards to below the dorsal fin.
- A. Dorsal fin with osseous ray.
- a'*. Dorsal fin rather short, with two smooth spines and seven branched rays; barbels none; pharyngeal teeth in a double series. *Pistachodon*.
- B. Dorsal fin without osseous ray.
- a'*. Lateral line incomplete; dorsal inserted behind the origin of the ventral; pharyngeal teeth in double series, slender and hooked, 5, 3-4, 4. *Phoxiscus*.
- a''*. Lateral line complete; dorsal inserted in advance of the origin of the ventral; pharyngeal teeth in double series, their outer surfaces deeply folded, 5, 2-2, 5. *Ctenopharyngodon*.
- III. Anal fin of moderate length, extending forwards to below the dorsal; lateral line, if complete, running into, or nearly into the middle of the tail; pharyngeal teeth in a single series; no dorsal spine.
- A. Lateral line complete; anal fin with eight to ten rays. *Acheilognathus*.
- B. Lateral line incomplete; anal fin with about twelve rays. *Rhodeus*.
- IV. Anal fin of moderate length; lateral line running along the lower half of the tail; pharyngeal teeth in three series.
- A. Barbels, none.
- a'*. Body moderately elongate and compressed; pharyngeal teeth 1 or 2, 4, 4 or 5-5, or 4, 4, 2 or 1; dorsal fin inserted a little behind or opposite to the origin of ventrals. *Zacco*.
- a''*. Body deep and strongly compressed; pharyngeal teeth 2, 4, 4-4, 4, 2; dorsal fin inserted above the interspace between ventrals and anal. *Metzia*.
- B. Barbels, two.
- a'*. Body elongate, laterally compressed; pharyngeal teeth 1, 4, 5-5, 4, 1; dorsal fin inserted opposite to ventrals. *Candidia*.
- V. Anal fin elongate; lateral line running along the middle of the tail; no dorsal spine; pharyngeal teeth in a single series, 4-4.
- a'*. Entire abdominal edge carinated; gill-rakers continuous, forming a crescentic horny membrane. *Hypophthalmichthys*.
- a''*. Postventral edge carinated; gill-rakers separated, slender and long. *Aristichthys*.

- VI. Anal fin elongate; abdomen, or a part of abdomen, compressed and carinated.
- A. Lateral line with no conspicuous curve, slightly decurved; entire, or a part of abdomen carinated.
- a'*. Abdomen behind the ventral compressed to an edge; before ventrals rounded; anal elongate, of seventeen rays; first dorsal ray more or less enlarged and spine-like. *Ischikauia*.
- a''*. Postventral edge carinated; rounded before ventrals; profile of the nape remarkably convex; lower jaw not protruding; anal fin elongate with more than twenty rays; dorsal fin armed with strong spines; scales rather large. *Chanodichthys*.
- a'''*. Entire or postventral edge carinated; profile of the nape slightly convex; lower jaw protruding; anal fin elongate; with more than twenty rays; dorsal fin armed with strong spines; scales small. *Culter*.
- B. Lateral line abruptly bent downwards above the pectoral.
- a'*. Abdominal edge entirely carinated; anal fin rather short, with fifteen to seventeen rays; dorsal fin with two smooth spines; scales large. *Cultricolus*.

Genus CARASSIUS Nilsson.

1832. *Carassius* NILSSON, Prodr. Ichthyol. Scand. (Type *Cyprinus carassius* Linnæus.)

Body oblong, compressed and elevated. Mouth terminal, without barbels. Teeth 4-4, molar, but compressed. Scales large. Lateral line continuous. Dorsal fins very long, with third ray developed into a stout spine, which is serrated behind; anal short with a similar spine. Ventrals well forward. Large species of the fresh waters of Europe and Asia; often domesticated. (Jordan & Fowler.)

Distribution: Central and Northern Europe; Siberia; China; Cochinchina; Formosa; Corea; Amur Province; Japan.

16. *Carassius auratus* (Linnæus).

Funa (Japan); Chiira or Chirahii (Formosa).

1758. *Cyprinus auratus* LINNÆUS, Syst. Nat. Ed. X, p. 323.—GÜNTHER, Ann. Ac. St. Petersb., 1896, p. 12; Huihsien; Chang-tu-fu.—RICHARDSON, Ichthyol. China, p. 293; Tse-Kiang.
1863. *Carassius auratus* BLEEKER, Atl. Ichthyol. Cypr., p. 74.—GÜNTHER, Cat. Fish., VII, 1868, p. 32; China; Japan.—BLEEKER, Cypr. China, 1871, p. 7; Peking.—GÜNTHER, Ann. Mag. Nat. Hist., Sept., 1873, p. 246; Shanghai.—SAUVAGE, Bull. Soc. Zool. France, IX, 1884, p. 1; Tonkin.—RUTTER, Proc. Acad. Nat. Sc. Philad., 1897, p. 58; Swatow.—FOWLER, Proc. Acad. Sc. Philad., 1899, p. 179; China.—ABBOTT, Proc. U. S. Nat. Mus., XXIII, 1901, p. 484; Pei-ho, China.—JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, 1903, p. 860; Japan.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., 1903, p. 321; Formosa.—VAILLANT, Bull. Mus. Hist. Nat., VI, 1904, p. 298;

- Ton-kin.—JORDAN & SEALE, Proc. U. S. Nat. Mus., XXIV, 1905, p. 519; Hongkong.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 404; Niigata; Same; Takamatsu River; Yamaguchi; Dogo Island.—JORDAN & METZ, Mem. Carneg. Mus., VI, No. 2, 1913, p. 14; Corea.—JORDAN, SNYDER & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 76; Japan.
1842. *Cyprinus gibelooides* CANTOR, Ann. Mag. Nat. Hist., IX, p. 485.—Richardson, Ichthyol. China, 1846, p. 292.
1846. *Carassius langsdorffii* SCHLEGEL, Fauna Japonica, Poiss., p. 192, pl. 98, Fig. 1; Japan.—KNER, Novara, Fisch, III, 1867, p. 346; Shanghai.—PETFRS, Monatsb. Ak. Berlin, 1880, p. 924.—SAUVAGE, Bull. Soc. Philom., 1881, p. 7; Swatow.—Bull. Soc. Zool. France, 1884, p. 1; Tonkin.
1855. *Carassius pekinensis* BASILEWSKY, Nouv. Mem. Soc. Nat. Mosc., X, p. 229, Tab. 3, Fig. 3; China.
1855. *Carassius discolor* BASILEWSKY, l. c., p. 229; China.
1855. *Carassius coeruleus* BASILEWSKY, l. c., p. 229; China.
1855. *Cyprinus macrophthalmus* BASILEWSKY, l. c., p. 230, Tab. V, Fig. 5.
1846. *Cyprinus carassiooides* RICHARDSON, Ichthyol. China, p. 291.
1846. *Cyprinus burgeri* RICHARDSON, l. c., p. 292.
1846. *Cyprinus abbreviatus* RICHARDSON, l. c., p. 292; Canton.

Head 3 in length; depth 2.25; D. II, 16; A. III, 5; P. 15; V. 9; scales 6-28-8; snout 3 in head; eye 5; interorbital space 2.4; pectoral 1.66; ventral 1.66; teeth 4-4.

Body stout, rather high, compressed, dorsal and ventral profiles about equally arched; head small, its top slightly depressed; snout blunt; mouth small, terminal and oblique; upper jaw protractile, more or less projecting; eyes large, superior and anterior; nostrils very large, in front of eyes, the anterior in a short tube.

Origin of the dorsal nearer the tip of snout than base of caudal, one scale in advance of the origin of ventral, with strong spines, soft rays shortening posteriorly, the first dorsal ray longest, 1.83 in length of

MEASUREMENTS OF *Carassius auratus*.

Locality.	Head.	Depth	D.	A.	P.	V.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Ritakukan.....	3	2.25	II, 16	III, 5	15	9	2.40	3	5	6-28-8	210
Giran.....	3.5	2.40	III, 16	III, 5	16	9	2.33	3	4.33	6-29-6	150
Giran.....	3.25	2.42	III, 17	III, 5	16	9	2.50	3	4.60	6-28-8	152
Giran.....	3.45	2.32	III, 16	III, 5	16	9	2.33	3.25	4.33	5-27-7	130
Shori.....	3	2.23	III, 17	III, 5	16	8	2.33	3	4.75	5-28-8	107

head; the anal squarish, armed with very strong spines, its rays longer in front, inserted nearer the base of caudal than that of the pectoral, its origin just below the fourteenth soft dorsal ray; pectoral fin round,

its tip scarcely reaching ventral; ventral fin not reaching the anus; caudal peduncle deep and long, its depth twice in head.

Body covered with large cycloid scales; lateral line nearly straight, extending along the middle of sides from upper part of gill-opening to the base of caudal.

Color in formalin uniformly dark gray, somewhat paler below; lower parts whitish; all the rays uniformly gray.

Total length 210 mm.

Described from a specimen from Ritakukansho, Giran.

Habitat: Abundant in the fresh waters of Formosa, very common.

Genus CYPRINUS (Artedi) Linnaeus.

1858. *Cyprinus* (ARTEDI) LINNÆUS, Syst. Nat. Ed. X, p. 320, (Type *Cyprinus carpio* Linnaeus.)

Body robust, compressed. Mouth moderate, anterior, with four long barbels. Snout blunt, rounded. Teeth molar, broad and truncate, 1, 1, 3-3, 1, 1. Scales large. Lateral line continuous. Dorsal fin very long, with a stout spine, serrated behind; anal fin short, also with a spine. Large fishes of the fresh waters of Asia. (Jordan & Fowler.)

Distribution: Temperate parts of Europe and Asia; introduced into North America.

17. *Cyprinus carpio* Linnaeus.

Koi (Japan); Taihii (Formosa).

1758. *Cyprinus carpio* LINNÆUS, System. Nat., Ed. X, p. 320.—GÜNTHER, Cat. Fish., VII, 1868, p. 25; Europe and Asia.—PETERS, Monatsb. Ak. Berl. 1880, p. 924 and 1029; Hongkong.—SAUVAGE, Bull. Soc. Philom., 1881, p. 7; Swatow.—Bull. Soc. Zoöl. France, IX, 1884, p. 1; Tonkin.—GÜNTHER, Ann. Mag. Nat. Hist. (7), 1889, p. 224; Yang-tsze-kiang.—Ann. Ac. St. Petersb., 1896, p. 12; Cheng-tu-fu.—RUTTER, Proc. Acad. Nat. Sc. Philad., 1897, p. 57; Swatow.—GÜNTHER, Ann. Mag. Nat. Hist. (7), I, 1898, p. 261; Newchang.—ABBOTT, Proc. U. S. Nat. Mus. XXIII, 1901, p. 484; Pei-ho.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXVI, 1903, p. 321; Formosa.—REGAN, Ann. Mag. Nat. Hist. (7), XIII, 1904, p. 191; Yunnan.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, p. 169; Formosa.—JORDAN & SEALE, Proc. Davenport Acad. Sc., X, 1905, p. 3; Hongkong.—Proc. U. S. Nat. Mus., XXXIII, 1906, p. 537; Buitenzorg; Java.—JORDAN & METZ, Mem. Carneg. Mus., VI, No. 2, 1913, p. 14; Corea.—JORDAN, SNYDER, and TANAKA, Journ. Coll. Sci., Tokyo, XXXIII, 1913, p. 76; Japan.

1798. *Cyprinus rubro-fuscus* LACÉPÈDE, Hist. Nat. Poiss., V, p. 530, Pl. 16, Fig. 1.—CUV. & VAL., Hist. Nat. Poiss., 1846, XVI, p. 74.—RICHARDSON, Ichthy. China, 1846, p. 288.

1798. *Cyprinus nigroauratus* LACÉPÈDE, Hist. Nat. Poiss., V, p. 547, Pl. 16, Fig. 2.—CUV. & VAL., Hist. Nat. Poiss., 1846, XVI, p. 73.—RICHARDSON, Ichthy. China, 1846, p. 290.
1798. *Cyprinus viridi-violaceus* LACÉPÈDE, Hist. Nat. Poiss., V, p. 547, Pl. 16, Fig. 3.—CUV. & VAL., Hist. Nat. Poiss., XVI, 1846, p. 75.—RICHARDSON, Ichthy. China, 1846, p. 288.
1846. *Cyprinus flavipinnis* CUV. & VAL., Hist. Nat. Poiss., XVI, p. 71.
1846. *Cyprinus vittatus* CUV. & VAL., Hist. Nat. Poiss., XVI, p. 72.
1846. *Cyprinus atrovirens* RICHARDSON, Ichthy. China, p. 287.
1846. *Cyprinus flammanus* RICHARDSON, Ichthy. China, p. 288.
1846. *Cyprinus acuminatus* RICHARDSON, Ichthy. China, p. 289.
1846. *Cyprinus sculponeatus* RICHARDSON, Ichthy. China, p. 290.
1846. *Cyprinus hamatopterus* SCHLEGEL, Fauna Japonica, Poiss., p. 189, Pl. 96.
1846. *Cyprinus melanotus* SCHLEGEL, Fauna Japonica, Poiss., p. 190, Pl. 97, Fig. 1.
1846. *Cyprinus conirostris* SCHLEGEL, Fauna Japonica, Poiss., p. 191, Pl. 97, Fig. 2.
1855. *Cyprinus chinensis* BASILEWSKY, Nouv. Mem. Soc. Nat. Mosc., X, p. 227, Tab. 2, Fig. 3.
1855. *Cyprinus obesus* BASILEWSKY, Nouv. Mem. Soc. Nat. Mosc., X, p. 228, Tab. 1, Fig. 2.
1863. *Carpio flavipinna* BLEEKER, Atl. Ichthyol. Cyprin., p. 74, Tab. 7, Fig. 3.
1871. *Carpio vulgaris* BLEEKER, Mem. Cyprin. China, p. 6.

Head 3 in length; depth 2.86; D. III, 19; A. III, 5; P. 16; V. 9. Scales 5-35-5; width of head 1.66 in its length; snout 2.5 in head; interorbital space 2.4; eye 7; pectoral 1.33; ventral 1.4; teeth 1, 1, 3-3, 1, 1.

Body stout, more or less compressed; head moderate, triangular; snout obtusely rounded; mouth oblique, with fleshy thick lips, maxillary reaching a vertical through anterior margin of anterior nostril; maxillary protractile; upper jaw more or less projecting; four barbels, two maxillary and two rostral, the former nearly twice as long as the latter, scarcely reaching the anterior border of orbit; eyes moderate, superior and slightly anterior; nostrils large, close together, in front of eye, the anterior in a short tube.

Origin of dorsal midway between tip of snout and base of caudal, two scales before the origin of ventral, triangular and elongate, higher anteriorly, its longest ray about twice in the length of head; pectoral fin large, round, its tip exceeding the origin of ventral; ventrals inserted below the first soft dorsal ray, not reaching the anus; origin of anal nearer base of caudal than base of ventral, inserted below the fourteenth ray of dorsal; caudal fin deeply emarginate, tip of lobes sharply pointed; caudal peduncle long and deep, its depth 2.11 in head.

Body covered with large scales with fine concentric rings and radiated striations; lateral line straight, extending along the middle of sides from upper part of gill-opening to the base of caudal.

Color in formalin uniformly dark grey above, paler below; sides of body below the lateral line yellowish white; lower parts of body together with the pectoral, ventral, and anal white; dorsal and caudal fins dusky; most of scales provided with a black spot on the base.

Total length 280 mm.

Described from a specimen from Taihoku, collected by Oshima in October, 1916.

Habitat: The present species is common throughout the island; and is the most important food-fish among the Chinese people.

MEASUREMENTS OF *Cyprinus carpio*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length. Mm.
Taihoku.....	3	2.86	III, 19	III, 5	16	9	1.66	2.40	2.50	7	5-35-5	280
Tensonpi, Giran.....	3.61	2.86	III, 17	III, 5	17	9	1.50	2.66	2.76	5	5-34-5	193
Inzanpo.....	3.33	2.94	III, 17	III, 5	16	9	1.57	2.66	2.47	5	6-33-5	132
Maruyama.....	3.35	3	III, 18	III, 5	16	9	1.45	2.45	2.53	6	5-35-5	193

Genus LABEO Cuvier.

1817. *Labeo* CUVIER, Regne Animal, p. 192. (Type *Cyprinus niloticus* (Forskål) Geoffroy).

1842. *Rohila* CUV. & VAL., Hist. Nat. Poiss., XVI, p. 242. (Type *Cyprinus nandina* Hamilton.)

Body oblong, more or less compressed. Snout broadly rounded or obtusely pointed, prominent, mostly covered with tubercles or pores and sometimes having a lateral lobe or projection, its anterior pendulous border forming an entire, or superficially incised, rostral fold. Mouth moderate or large, protractile, inferior. Lips thick, continuous, the upper and the lower one fringed, lobed, or not lobed. The lower lip is distinctly separated by a deep groove from isthmus, or this postlabial groove is divided by a broad or narrow connection between isthmus and lip, and therefore restricted to behind the lateral part of the lower lip or even to the corner of the mouth. Lower lip with an inner transverse fold. Jaws with a fleshy covering carrying a deciduous horny sheath. A pair of rostral and maxillary barbels, one of them may be absent. Eye with a free circular rim. Dorsal elongate, without osseous rays, commencing before ventrals and

ending before or above anal, with more than eight branched rays. Anal short, with five branched rays. Scales moderate or small. Lateral line running into the middle of the tail, sensory tubes undivided. Gill-membranes broadly united with isthmus. Gill-rakers usually short. Pharyngeal teeth in three series, hooked, 5, 4, 2-2, 4, 5 (Weber & Beaufort).

Distribution: Sumatra; Java; Borneo; Africa; India; Ceylon; Burma; Cochin-China; China; Formosa.

18. *Labeo jordani* sp. nov. (Plate XLIX, Fig. 3).

Kenhi (Formosa).

1903. *Rohita decora* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 321; Formosa (not of Peters).

Head 5 in length; depth 3; D. 3, 12; A. 3, 5; P. 15; V. 9; forty scales in the lateral line, eight scales in an oblique series between origin of dorsal and lateral line, nine scales between the latter and the middle of belly; width of head 1.83 in its length; snout 2.33 in head; inter-orbital space 2; eye 5; pectoral 1.076; ventral slightly longer than head; teeth 5, 4, 2-2, 4, 5.

Body compressed, rather high, abdomen rounded; head short, lateral parts of the occiput slightly depressed; snout obtusely rounded anteriorly, overhanging the upper lip, with no tubercle nor lateral prolongation; mouth inferior, transverse, crescent-shaped, with thick lips; upper lip entirely fringed, with a distinct inner fold below; lower lip not fringed, with an inner fold, its edge sharp and covered with a horny substance; barbels two, rostral, nearly one-third as long as snout; maxillary barbels none; eye rather small, slightly anterior and superior; nostrils close together, in front of the eye; pharyngeal teeth high, their grinding surface flat, brown-colored; gill-rakers numerous, minute, setiform, and closely set.

Origin of dorsal nearer tip of snout than base of caudal, its upper margin concave, its base covered with a series of pointed scales, anterior ray longest; anal fin entirely behind the dorsal, nearer the base of caudal than origin of ventral; ventral long, with well-developed scaly flap, inserted below fourth divided dorsal ray; pectoral fin shorter than ventral, reaching three-fifths of the distance to ventral; caudal fin bilobed, tip of each lobe sharply pointed; caudal peduncle rather short, its depth 1.4 in head.

Body covered with large scales with fine concentric rings and

radiated striations; lateral line nearly straight, extending along the middle of sides from base of the caudal to the upper part of gill-opening.

Color in alcohol uniformly dark grey above, sides and lower parts silvery; dorsal and caudal fins grayish; other fins dusky white; scales on the upper part of body with a black lunar-shaped spot near the base.

Total length 340 mm.

Described from a specimen from the hatchery at Shori.

Habitat: A species introduced from China, propagated throughout the island, and bred artificially in ponds.

Remarks: The nearest relative of the present species is *Labeo decorus* Peters from Hongkong. It differs, however, in having an upper lip which is fringed at the sides only, and a distinctly fringed lower lip.

Jordan and Evermann recorded a Formosan species of the genus *Labeo* under the name *Rohita decora* (= *Labeo decorus* Peters). The descriptions given by these authors are very inadequate. But the briefly described characters, except the number of rays of the pectoral, agree quite well with those of the present species. Moreover, as there is no record with reference to the occurrence of any species of *Labeo* in Formosa except the introduced species, it seems reasonable to unite Jordan & Evermann's *Rohita decora*, which distinctly differs from Peters' *Labeo decorus*,³ with the present species.

In the year 1910, Mr. Seno, Expert of the Fisheries Bureau of the Japanese Government, described the present species, giving it the name *Labeo kontius* (Jordan). (Cf. Report on the Fisheries of the Island of Formosa). The Indian species of that name distinctly differs from the Formosan species in having a higher body, longer head, tuberculated snout with a fleshy lateral prolongation, fringed lower lip, and no barbels.

Such being the case, I propose for the present species a new name *Labeo jordani*.

"Kenhi" is one of the important fresh-water food-fishes in Formosa, though it is not a native of the island. Early in the summer, newly hatched larvæ of this fish are collected in the rivers near Swatow, South China, and are imported to Formosa. At first they are bred in small ponds, living mainly upon zoö-plankton, the growth of which is encouraged by human excrement. As soon as they are large enough to

³ *Labeo decorus* Peters, Monatsb. Ak. Berlin, 1880, p. 1031; Hongkong.

be safe under natural conditions (30–60 mm. long), they are sold to the Chinese farmers. Usually, at the end of one year they grow to the length of 150–160 mm. According to the Chinese breeders' information this fish never spawns in Formosa.

MEASUREMENTS OF *Labco jordani*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Shori	5	3	3.12	3.5	15	9	1.83	2	2.33	5	8-40-9	340
Shori	5	3.11	3.12	3.5	14	9	1.83	2	2.50	5	8-40-9	209

ACROSSOCHEILUS gen. nov.

Type *Gymnostomus formosanus* Regan.

Body elongate, compressed; head smooth, with many mucous cavities around the eye; snout obtuse, its tip not projecting beyond the upper lip, without lateral lobe. Mouth inferior, transverse; upper lip fleshy, not fringed; lower lip thick, not continuous, distinct at the side of the mouth only; upper jaw projecting beyond the longer; anterior edge of the lower jaw sharp and naked. Four barbels, two maxillary and two rostral. Dorsal fin without osseous ray, with not more than nine rays, opposite the ventral; anal fin rather short, with five divided rays. Scales moderate, about forty in the lateral line; lateral line running along the middle of the tail. Pharyngeal teeth 5, 3, 2-2, 3, 5.

Distribution: Formosa; China.

Remarks: The present genus is very closely related to *Crossocheilus* Van Hasselt. Four barbels and smooth upper lip are the characteristics of *Acrossocheilus*, which distinguish it from the latter.

19. *Acrossocheilus formosanus* (Regan).

Chopien or Choppan (Formosa).

1908. *Gymnostomus formosanus* REGAN, Ann. Mag. Nat. Hist. (8), I, p. 149; Lake Candidius, Formosa.

1908. *Gymnostomus labiatus* REGAN, Ann. Mag. Nat. Hist. (8), II, p. 358; Lake Candidius, Formosa.

Head 4 in length; depth 4; D. 3, 8; A. 3, 5; P. 14; V. 9; width of head 1.8 in its length; interorbital space 3 in head; snout 2.5; eye 5; pectoral 1.16; ventral 1.25; forty scales in a longitudinal series, five and one-half in a transverse series from origin of dorsal to lateral line,

five between the latter and middle of belly, three and one-half scales between lateral line and origin of ventral; pharyngeal teeth 5, 3, 2-2, 3, 5; gill-rakers 5 + 9.

Body elongate, depth equal to the length of head, dorsal profile more convex than the ventral; head smooth, with many mucous cavities around the eye; snout not projecting beyond the upper lip, with strongly curved profile; sides of snout pitted, in the centre of each pit a small round tubercle; upper jaw projecting beyond the lower; mouth inferior, transverse, its angle not reaching the anterior border of orbit; upper lip fleshy, rather thin; lower lip thick, divided into two lobes by a median longitudinal notch, anterior border naked, with a sharp inner transverse horny edge; four barbels, the rostral two-thirds as long as the maxillary barbels, the latter reaching the posterior border of orbit; eye superior and slightly anterior; nostrils close together, in front of eye, anterior nostril in a short tube.

Origin of dorsal slightly in advance of a point midway between tip of snout and base of caudal, opposite the ventral; pectoral fin not reaching the ventral; ventral inserted one scale behind the origin of dorsal; anal entirely behind the dorsal, its rays rather long, when depressed, tip of the anterior ray extending beyond the others; caudal fin strongly forked, tip of each lobe sharply pointed.

Body covered with uniform scales; lateral line continuous, nearly straight, extending along the middle of the tail.

Color in formalin olive-brown above the lateral line, yellowish gray beneath; sides with seven black vertical bars; lower parts of body pale reddish yellow; membrane of the dorsal with black streaks; caudal and pectoral fins gray; other fins dusky white.

Total length 115 mm.

The present description is from a specimen from Shinchiku, collected by T. Aoki in December, 1916.

Habitat: Tamsui River at Shinten and Heirinbi; Shinchiku; Tozen River; Horisha; Jitsugetsutan (Lake Candidius).

Remarks: The type of the genus *Gymnostomus* Heckel is *Cyprinus ariza* Buchanan-Hamilton. Although it is provided with moderately large scales (thirty-seven in the lateral line), it differs distinctly from the species which belong to *Acrossocheilus* in having two small barbels instead of four.

In February, 1908, Mr. C. Tate Regan described the present species naming it *Gymnostomus formosanus* (from Lake Candidius). But as

it is provided with four rather long barbels, it is incorrect to include it in the genus *Gymnostomus*.

In October of the same year Regan described *Gymnostomus labiatus* from the same locality. According to his description it differs from the former in having lower lips which are separated anteriorly by a deep narrow notch instead of being separated widely. In my specimens which came from the type locality and other places, the width of the inter-space between the lower lips is not definite; even in the specimens which came from the same locality there are deviations with regard to that character. Therefore it seems inadvisable to separate the two forms.

MEASUREMENTS OF *Acrossocheilus formosanus*.

Locality	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Heirinbi.....	4.25	3.64	3, 8	3, 5	15	9	1.73	2.77	2.40	4.33	6	-42-5 120
Heirinbi.....	4.18	3.47	3, 8	3, 5	16	9	1.75	2.80	2.25	4.50	6	-42-5 140
Tamusui River....	4	3.50	3, 8	3, 5	16	9	2	3	2.28	4.50	6	-41-5 165
Tamusui River....	4.12	3.44	3, 8	3, 5	16	9	2	2.66	2.50	5	5 $\frac{1}{2}$	-42-5 202
Jitsugetsutan.....	4.40	3.20	3, 8	3, 5	14	9	1.50	2.60	2.50	5	6	-41-6 165
Horisha.....	4	3.74	3, 8	2, 5	16	9	1.91	3	2.75	4.66	6	-41-5 105
Shinchiku.....	4	4	3, 8	3, 5	14	9	1.80	3	2.50	5	5 $\frac{1}{2}$	-40-5 115
Shinchiku.....	4.5	3.86	3, 8	3, 5	15	9	1.71	2.75	2.60	4.50	5	-42-6 125
Tozen River.....	4.16	3.66	3, 8	3, 5	15	9	1.71	3	2.77	4	5 $\frac{1}{2}$	-41-5 120
Tozen River.....	4.14	3.73	3, 8	3, 5	15	9	1.86	2.66	2.45	4.83	6	-42-6 135

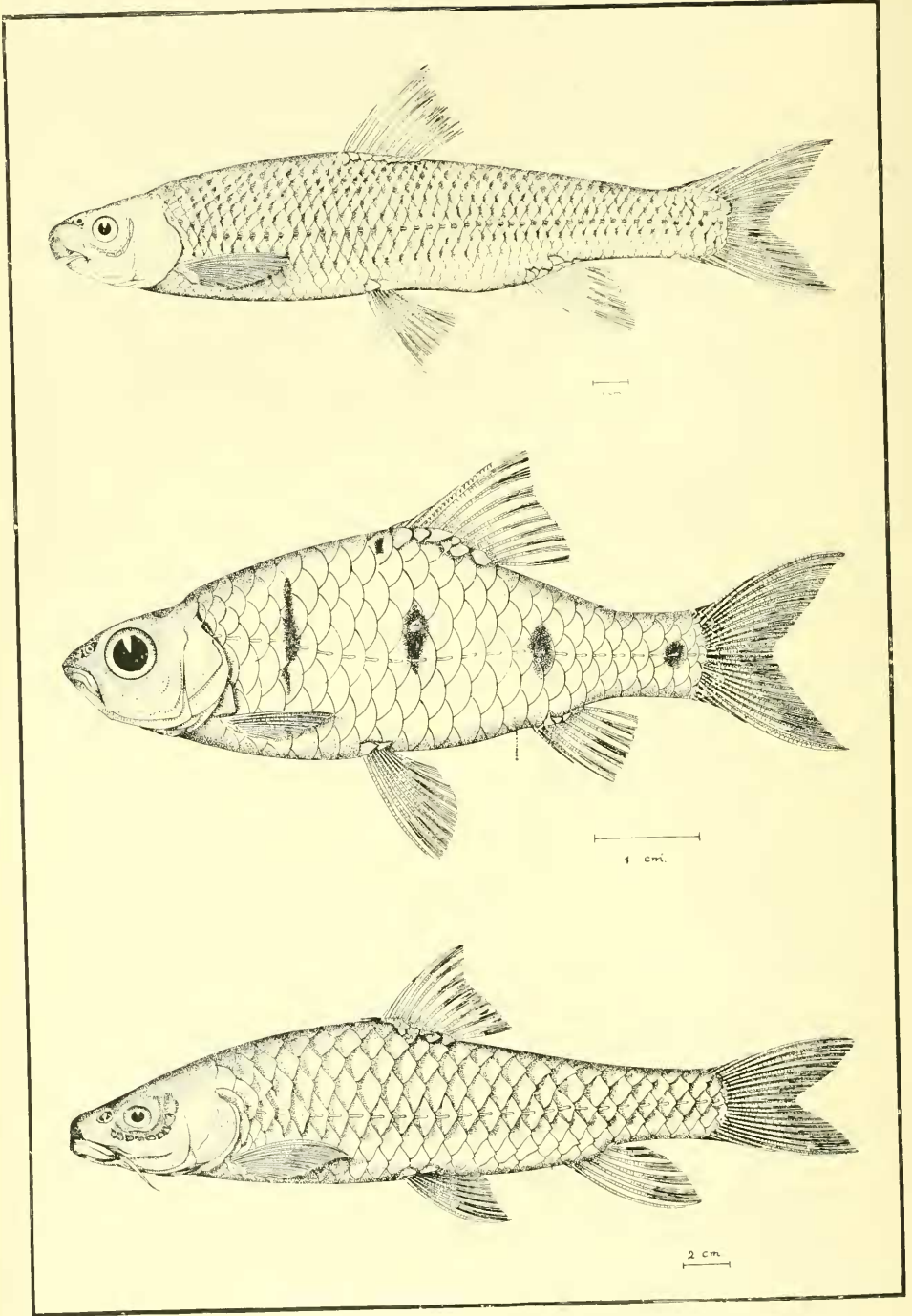
SCAPHESTHES gen. nov.

Body elongate, slightly compressed. Snout rounded, tip of the skin extends downwards and partially overlaps the upper lip. Mouth transverse, inferior, lower jaw with no lip, its anterior margin sharp and covered with a horny brown layer. Barbels two, minute, at the corner of the mouth. Dorsal fin without osseous rays, with not more than nine branched rays, opposite to the ventrals. Anal fin rather short. Scales large, less than fifty in a longitudinal series. Pharyngeal teeth in three rows, 5, 3, 2-2, 3, 5. Lateral line running along the middle of the tail.

Distribution: Formosa; Hainan.

Remarks: The type of the present genus is closely related to the species of *Scaphiodon*. It differs, however, in having larger scales and no osseous dorsal ray.

In the year 1899, Boulenger described a species of Cyprinoid fish



Scaphesthes tamsuiensis Oshima, sp. nov.

Puntius snyderi Oshima, sp. nov.

Spinibarbus hollandi Oshima, sp. nov.

from the interior of Hainan giving it the name *Gymnostomus lepturus*.¹ Although there is no statement with regard to the barbels it seems to belong to the present genus, because of the peculiar shape of the mouth, large scales, and the absence of an osseous dorsal spine. The barbels of *Scaphesthes* are very small, and hidden beneath the labial fold. Therefore, they might have been overlooked by that author.

20. *Scaphesthes tamusuiensis* sp. nov. (Plate L, Fig. 1).

Kooye (Formosa).

Head 5 in length; depth 4.5; D. 3, 8; A. 3, 5; P. 17; V. 9; width of head 1.87 in its length; eye 4.33 in head; interorbital space 2.5; snout 2.6; pectoral 1.2; ventral 1.33; scales forty-six in the lateral line, seven in an oblique series between origin of dorsal and lateral line, six from the latter to the middle of belly; pharyngeal teeth 5, 3, 2-2, 3, 5; gill-rakers 5 + 27.

Body elongate, slightly compressed, abdomen rounded; head rather small, its top more or less convex; snout obtusely rounded; tip of the skin extends downwards and partially overlaps the upper lip; mouth transverse, inferior, crescent-shaped; upper lip smooth, without labial fold; lower jaw with no lip, mandibular edge nearly straight, sharp, covered with a horny brown layer; barbels four, two rostral and two maxillary, very minute, the latter hidden in the deep lateral fissure behind the angle of mouth; eyes moderate, superior and anterior; nostrils close together in front of eyes, the anterior nostril covered with a flap; pharyngeal teeth in three rows, those of the outer row canine-like, slender, slightly curved, those of the inner rows are smaller; gill-rakers very minute; gill-openings large.

Dorsal fin inserted nearer tip of snout than base of caudal, armed with smooth soft spines, anterior ray the longest; anal fin entirely behind the dorsal, slightly in advance of a point midway between origin of ventral and base of caudal; the ventral inserted behind the origin of dorsal; the pectoral reaches three-fifths the distance to ventrals; caudal fin deeply forked, the lobes pointed; caudal peduncle elongate, its depth 2.2 in head.

Body covered with uniform cycloid scales; the ventral with scaly flaps, no scaly pectoral flap; lateral line continuous, extending along the middle of the sides, slightly decurved anteriorly.

¹*Gymnostomus lepturus* Boulenger, Proc. Zool. Soc. London, 1899, p. 961, Pl. LXIX, Fig. 1; Hainan.

Color in formalin grayish brown above, paler below the lateral line, lower surface silvery; dorsal and caudal gray, outer margin of the former with a series of black streaks; pectorals fuscous; other fins whitish.

Total length 230 mm.

Described from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1916.

Habitat: Tamusui River (Shinten, Heirinbi); Choso River; Giran River (Inzanpo, Kiburan).

Remarks: *Scaphesthes lepturus* from Hainan is closely related to the present species. It differs, however, in having a larger eye, the dorsal inserted midway between the end of snout and base of caudal, the ventral below middle of dorsal, six divided anal rays, and forty-nine scales in the lateral line. There is no statement with reference to the barbel in Boulenger's original description.

MEASUREMENTS OF *Scaphesthes tampusuiensis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Tamusui River.....	5	4.50	3, 8	3, 5	17	9	1.83	2.50	2.40	4.8	6 $\frac{1}{2}$ -46-6	230
Tamusui River.....	4.75	4.16	3, 8	3, 5	16	10	1.60	2.50	2.60	4.5	7-47-6	183
Tamusui River.....	4.75	4.25	3, 8	3, 5	16	10	1.75	2.33	2.83	4.66	6 $\frac{1}{2}$ -47-6	200
Choso River.....	4.71	3.84	3, 8	3, 5	17	10	2.21	3	3.20	4	7-47-6	255
Giran River.....	4.42	4.20	3, 8	3, 5	17	10	1.58	2.50	2.85	4	7-47-6	102
Heirinbi.....	4.20	4.20	3, 8	3, 5	16	10	1.78	2.66	2.66	3.66	6-47-6	80
Taishu.....	4.33	4.64	3, 8	3, 5	15	10	1.66	2.50	3	3.66	6-47-6	78
Taishu.....	4.41	4.42	3, 8	3, 5	16	10	1.78	2.40	3	3.66	6-47-6	90

Genus HEMIBARBUS Bleeker.

1861. *Hemibarbus* BLEEKER, Prodr. Cyprin., p. 281. (Type *Gobio barbatus* Temminck & Schlegel.)

1869. *Gobiobarbus* DYBOWSKI, Verh. Zoöl.-Bot. Gesell. Wien, XIX, p. 951. (Type *Cyprinus labeo* Pallas.)

Body elongate, rather slender, and compressed. Head elongate, somewhat pointed, and with many mucous cavities about the eyes and along the edge of the pre-operculum; snout long, blunt at the tip; eye rather large, high; mouth inferior, the maxillary not reaching eye; lip fleshy; each maxillary with a barbel as long as eye; teeth 5, 3, 1-1, 3, 5. Gill-rakers short; intestine short. Peritoneum silvery; scales cycloid, about forty-nine. Dorsal inserted nearer tip of snout than base of caudal, and armed with a slender, sharp, strong, and smooth

spine; anal inserted far behind tip of compressed dorsal; caudal deeply emarginate, the lobes pointed; ventrals inserted behind origin of the dorsal. Lateral line slightly decurved and continuous. (Jordan & Fowler.)

Distribution: Formosa; China; Corea; Amur Province; Japan.

21. *Hemibarbus labeo* (Pallas).

Migoi (Japan); Tekotau (Formosa).

1776. *Cyprinus labeo* PALLAS, Reise III, p. 207, 703; Onon.—N. Acta Acad. Petropol., I, 1787, p. 355. T. XI, figs. 8, 9; Onon; Ingoda; Schilka.—Zoögr. Ross. Asiat., III, 1811, p. 305; Dauria; Ingoda; Onon; Schilka.
1842. *Gobio barbatus* SCHLEGEL, Fauna Japonica, Poiss., p. 198, Pl. XCIX, Fig. 1; Nagasaki.
1860. *Hemibarbus barbatus* BLEEKER, Prods. Cyprin., p. 281.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1902, p. 322; Formosa.—JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, 1903, p. 824; Japan (Yodo River; Lake Janzabrobata; Aomori; Chikugo River; Tokyo).
1868. *Barbus schlegelii* GÜNTHER, Cat. Fish., VII, p. 135; Formosa; Japan.
1869. *Gobiobarbus labeo* DYBOWSKI, Verh. Zoöl.-Bot. Gesell. Wien, XIX, p. 951, T. XV, Fig. 3; Onon; Ingoda.
1892. *Barbus schlegelii* STEINDACHNER, Denkschr. Akad. Wien, LIX, p. 370; Seoul, Korea.
1896. *Acanthogobio güntheri* GÜNTHER, Ann. Mus. Zoöl. St. Petersb., I, p. 215; Hui-hsien; Huang-ho; Sinin River, China.
1904. *Acanthogobio oxyrhynchus* NILOLSKY, Ann. Mus. Zoöl. St., Petersb., VIII, p. 358; Ussuri.
1907. *Barbus labeo* BERG, Ann. Mus. Zoöl. St. Peterb., XII, p. 3; Corea.
1909. *Hemibarbus labeo* BERG, Ichthyol. Amus., p. 75.—JORDAN & METZ, Mem. Carneg. Mus., VI, no. 2, 1914, p. 15; Corea.

Head 3.44 in length; depth 4.83; D. III, 6; A. III, 6; P. 20; V. 9; width of head 2 in its length; interorbital space 3.75 in head; eye 5; snout 2.15; pectoral 1.38; ventral 1.91; forty-nine scales in the lateral line, seven scales in an oblique series between origin of dorsal and lateral line, six scales from the latter to the middle of belly, four scales between lateral line and the root of ventral; pharyngeal teeth 5, 3, 1-1, 3, 5; gill-rakers 7 + 10.

Body elongate and compressed; head elongate, pointed, its top compressed, with many mucous cavities around the eye and below and behind the pre-operculum; snout long, pointed and produced; eyes large, superior and slightly posterior; mouth inferior, with fleshy lips, its angle not reaching the orbit; upper jaw protractile, longer than the lower; barbels two, maxillary, slender, as long as the diameter

of eye; nostrils together, in front of the eye, much nearer the eye than the tip of snout, anterior nostril in a short tube; interorbital space broad and flattened; gill-openings large; gill-rakers short and fleshy.

Dorsal fin inserted nearer tip of snout than base of caudal, rays straight and strong, longer in front, when depressed first ray reaches beyond the others, spine straight, smooth, and long; pectorals reach three-fourths the distance to ventrals; origin of ventral behind that of dorsal, about midway between tip of snout and base of caudal; the anal entirely behind the dorsal, inserted midway between origin of ventral and base of caudal; caudal fin deeply emarginate, the tip of each lobe pointed; caudal peduncle elongate, its depth 3 in head.

Scales large, of more or less uniform size, cycloid; pectoral with scaly flap, ventral flap moderate, pointed; lateral line continuous, anterior part slightly decurved.

Color in formalin grayish brown above, paler below; sides and lower parts silvery, with no dark spots; dorsal and caudal fins pale gray, the rest of fins whitish.

Total length 290 mm.

Described from a specimen from Tamsuï River, collected by T. Aoki in December, 1915.

Habitat: Tamsuï River near Shinten and Heirinbi; Rig yokutsu, Nanto.

Remarks: The present species is very closely related to *Hemibarbus maculatus* from China, differing from it only in color. Color of *H. maculatus* in alcohol (Stanford Collections No. 8414; Pei-ho, China,

MEASUREMENTS OF *Hemibarbus labe*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Tamsuï River.	3.80	4.83	III, 7	III, 6	20	9	2	3.75	2.15	5	7-49-6	290
Tamsuï River.	3.50	5	III, 7	III, 6	20	9	2.50	3.40	2.11	4.50	7-49-6	260
Rig yokutsu.	3.50	4.33	III, 7	III, 6	20	9	2.33	4	2.25	5	7-48-6	265
Heirinbi.	3.31	4.66	III, 7	III, 6	20	9	2	3.66	2.42	3.87	7-48-6	128

290 mm. long; described by Jordan and Starks under the name; *Hemibarbus joïeni*) pinkish yellow, with a longitudinal series of eight large spots above the lateral line; smaller spots irregularly placed on back and sides; dorsal and caudal with similar black spots; other fins without markings. Although faint dark spots are present in the

young specimen of *Hemibarbus labeo*, they are not permanent; the color of the adult is always uniformly grayish brown.

Genus BARBODES Bleeker.

1860. *Barbodes* BLEEKER, Nat. Tijdschr. Ned. Ind., XX, p. 431. (Type *Barbodes belinka* Bleeker.)

Body strongly compressed, more or less elevated, with the profile of the back arched; head of moderate size, its length being one-fourth of the length without caudal; snout shorter than the postorbital part. Mouth subinferior, arched, without inner fold. Barbels four, two maxillary and two rostral, rather short. Scales of moderate size, about forty in the lateral line. Lateral line continuous, running along the middle of the sides. Dorsal fin with three osseous spines, the third the longest, inner border of which is coarsely serrated or smooth; with not more than nine branched rays, inserted above or a little behind the origin of the ventral. Pharyngeal teeth 4, 3, 2—2, 3, 4.

Distribution: Philippine Islands; Malay Archipelago; India to South China; Formosa.

22. *Barbodes paradoxus* (Günther).

1868. *Barbus paradoxus* GÜNTHER, Cat. Fish., VII, p. 97. Formosa.

Head 4 in length; depth 3.5; D. III, 9; A. 2, 6; P. 15; V. 9; width of head 1.86 in its length; interorbital space 2.66 in head; snout 3; eye 3; pectoral 1.18; ventral 1.20; thirty-nine scales in the lateral line, six scales in an oblique series between origin of dorsal and lateral line, six scales between the latter and the middle of the belly, three scales from lateral line to the root of the ventral; pharyngeal teeth, 4, 3, 2—2, 3, 4; gill-rakers 4 + 9; branchiostegals 3.

Body oblong, slightly compressed; abdomen rounded; head moderate, its top convex; snout shorter than postorbital part, obtusely pointed anteriorly, its dorsal profile rounded; mouth subinferior, arched, its angle not reaching the orbit; lips fleshy, lower lip distinct only near the angle of mouth; lower jaw shorter than the upper, its tip naked; four barbels, two maxillary and two rostral; eyes moderate, slightly superior and anterior; nostrils close together, in front of eye, the anterior in a short tube.

Origin of dorsal midway between the tip of snout and base of caudal, opposite the root of ventral; inner border of third spine not serrated, its length 1.71 in head; pectorals not reaching the ventral;

ventral beneath the dorsal, not reaching the anal; anal rather short, anterior ray the longest; caudal fin emarginate, tip of each lobe pointed.

Scales moderate, cycloid; lateral line nearly straight, extending along the middle of sides, very slightly decurved.

Color in formalin dark gray above, lower parts of sides dusky yellow; belly whitish; sides with seven dark brown cross-bars, of which the third and fifth reach the back, the others shorter; membrane of the dorsal with a black streak between each ray; caudal fin dusky; other fins whitish.

Total length 61 mm.

The present description is from a specimen from Taiko River, collected by T. Aoki in December, 1916.

Habitat: Taiko River (a single specimen, young fish).

Remarks: In Günther's original description there is no statement about the dark cross-bars on the sides. Probably they had disappeared, as his specimens from Formosa were adults, measuring from eight to eight and one-half inches in length.

Genus CAPOETA Cuv. & Val.

1842. *Capoeta* Cuv. & VAL., Hist. Nat. Poiss., XVI, p. 278. (Type *Capoeta fundulus* Cuv. & Val.)

Body elongate, compressed, rather deep; head moderate; snout somewhat pointed, nearly as long as the eye. Mouth narrow, sub-inferior; upper jaw slightly overlapping the lower; barbels two, maxillary, slender. Scales large, about twenty-five in the lateral line. Dorsal fin with three osseous spines, the third strongly serrated behind; eight branched rays, fin inserted in advance or opposite to the origin of the ventral; anal fin rather short. Pharyngeal teeth 5, 3, 2—2, 3, 5; lateral line running along the middle of the sides.

Distribution: Malay Archipelago, India to South China.

23. *Capoeta semifasciolata* (Günther).

Anbakutai (Formosa).

1868. *Barbus fasciolatus* GÜNTHER, Cat. Fish., VII, p. 140; China (not of page 108).

1868. *Barbus semifasciolatus* GÜNTHER, Cat. Fish., VII, p. 484; China (substitute for *B. fasciolatus* of page 140; *B. fasciolatus* pre-occupied).

1871. *Puntius (Capoeta) güntheri* BLEEKER, Mem. Cyprin. Chine, p. 9 (substitute for *B. fasciolatus* Günther of page 140, *l. c.*).

Head 3.66 in length; depth 2.8; D. III, 8; A. 2, 6; P. 13; V. 9; width of head 1.71 in its length; eye 3 in head; interorbital space 2.33;

snout 3; pectoral 1.375; ventral 1.33; twenty-five scales in the lateral line; four scales in an oblique series from origin of dorsal to lateral line, two between the latter and the root of ventral, four scales between lateral line and the middle of belly; pharyngeal teeth 5, 3, 2—2, 3, 5; gill-rakers rudimentary.

Body elongate, compressed, rather deep; head moderate, top more or less convex; snout short, obtusely rounded anteriorly; mouth subinferior, arched, its angle not reaching the orbit; lip fleshy; lower jaw slightly shorter than the upper; barbels two, maxillary, slender; eyes moderate, anterior; nostrils close together, in front of eye, the anterior in a short tube.

Origin of dorsal midway between the tip of snout and base of caudal, nearly opposite that of the ventral, first spine minute, third spine strongly serrated behind, its length 1.66 in head; pectoral fin not reaching the ventral; anal short, anterior ray the longest; caudal fin emarginate, the tip of each lobe pointed.

Scales rather large; base of the dorsal and anal provided with scaly sheath; ventral flap present, scaly; no pectoral flap; lateral line continuous, extending along the middle of the sides, slightly decurved.

Color in formalin pale gray above, paler below; belly whitish; sides with about seven short black cross-bars, none of them reaching

MEASUREMENTS OF *Capoeta semifasciolata*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Akō.....	3.66	2.80	III, 8	2, 6	13	9	1.71	2.33	3.00	3	4-25-4	51
Akō.....	3.33	2.86	III, 8	2, 5	13	9	1.71	2.40	3.00	3	4-24-4	49
Akō.....	3.25	3	III, 8	2, 5	13	9	1.71	2.60	3.25	3.25	4-24-4	48

the back or belly; a round black spot on the end of lateral line; back with numerous small black spots; a large dark spot on the top of the head; an obscure black longitudinal streak along the median dorsal line; dorsal and caudal fins dusky, the rest of fins whitish.

Total length 51 mm.

Described from a specimen from Akō, collected by T. Aoki in December, 1916.

Habitat: Akō (nine specimens).

Genus PUNTIUS Hamilton.

1822. *Puntius* HAMILTON, Fishes of the Ganges, p. 388. (Type *Cyprinus puntio* Hamilton.)

Body oblong, rather high, slightly compressed. Mouth anterior and oblique, with no labial fold; lower lips continuous, without horny covering. Barbels none. The osseous dorsal spine of moderate strength, smooth or serrated behind, the fin inserted in advance of or a little behind, the origin of the ventral; anal with five or six divided rays. Scales large, less than thirty in the lateral line. Lateral line continuous, extending along the middle of the tail. Pharyngeal teeth in three series, 5, 3, 2—2, 3, 5.

Distribution: Malay Archipelago; British India.

Remarks: Dr. Bleeker restricted the present genus to include a group of fishes, the type of which is *Cyprinus sophore* Hamilton, but the type of the genus *Puntius* has no barbel, thus being distinguished from *C. sophore* which has four barbels.

24. *Puntius snyderi* sp. nov. (Plate L, Fig. 2).

Anbakutai (Formosa).

Head 3.58 in length; depth 3; D. IV, 9; A. 2, 6; P. 13; V. 9; width of head 1.7 in its length; eye 3 in head; interorbital space 2.66; snout 3; pectoral 1.42; ventral 1.42; twenty-four scales in the lateral line, four scales in an oblique series between origin of the dorsal and lateral line, four scales between the latter and the middle of belly, three scales between lateral line and the root of the ventral; pharyngeal teeth 5, 3, 2—2, 3, 5; gill-rakers 1 + 4.

Body oblong, slightly compressed, abdomen rounded; head moderate, its top more or less convex, profile on the nape slightly concave; snout rather short, anterior margin obtusely rounded; mouth anterior and oblique, its angle not reaching the orbit; lower jaw slightly shorter than the upper; lips fleshy; no barbel; nostrils close together, nearer than orbit the tip of snout, the anterior nostril in a short tube; eyes moderate, slightly anterior and superior; pharyngeal teeth sharp and hooked; gill-rakers short, rudimentary.

Origin of the dorsal midway between tip of snout and base of caudal, slightly behind that of the ventral, first and second spines minute, third spine about one-third as long as the fourth, which is the strongest and is serrated behind; the pectoral slender, not reaching the ventral; ventral fin inserted in front of origin of the dorsal; the anal short,

entirely behind the dorsal; caudal fin emarginate, each lobe sharply pointed.

Scales rather large, cycloid; base of the dorsal fin covered with scaly sheath; lateral line continuous, very slightly decurved, extending along the middle of the tail.

Color in formalin dark gray above, paler below; sides with three black cross-bars, a black spot near the base of the caudal; above the gill-opening a short dark brown streak; a brown semilunar spot on the occiput; all the fins uniformly dusky white.

Total length 77 mm.

The present description is from a specimen from Rigyokutsu, Nanto, collected by T. Aoki in December, 1916.

Habitat: Rigyokutsu, Nanto; Maruyama near Taihoku; Daito River.

MEASUREMENTS OF *Puntius snyderi*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Rigyokutsu.....	3.58	3	IV, 9	2, 6	13	9	1.70	2.66	3	3	4-24-4	77
Rigyokutsu.....	3.60	3	IV, 8	2, 6	13	9	1.87	2.66	3.33	3.33	3 $\frac{1}{2}$ -24-4	66
Maruyama.....	3.50	3	IV, 8	2, 5	13	9	1.83	2.50	3	3	3 $\frac{1}{2}$ -24-4	43
Daito River.....	3.16	3	IV, 8	2, 5	13	9	2	2.60	3.5	3.25	3 $\frac{1}{2}$ -23-4	48
Daito River.....	3.50	3	IV, 8	2, 5	13	9	1.86	2.80	3.4	3.4	3 $\frac{1}{2}$ -23-4	58
Daito River.....	3.50	3	IV, 8	2, 5	13	9	1.83	2.60	3.25	3.75	4-24-45	50

Genus SPINIBARBUS gen. nov.

Body elongate, more or less compressed, abdomen rounded. Dorsal fin short, slightly in advance of the origin of ventral, with eight branched rays and three unserrated osseous spines, the third spine stronger than the others. Anal fin rather short, with five branched rays. Mouth somewhat inferior, with the margin of the lower jaw obtuse; lips without inner fold. Four barbels the maxillary much longer than the rostral. A recumbent spine in front of the dorsal, pointing forward, its basal portion hidden by the scales. Scales large; lateral line running along the middle of the tail. Gill-openings extend to below the angle of operculum. Gill-rakers short and fleshy. Pharyngeal teeth 5, 3, 2—2, 3, 5.

Distribution: Formosa.

Remarks: Although the type of the present genus agrees very well with Günther's *Mystacoleucus* (Günther, Cat. Fish. Brit. Mus., VII, 1868, p. 206), it differs remarkably from it in having unserrated dorsal

spines, a less number of divided anal rays, pharyngeal teeth of 5, 3, 2—2, 3, 5 instead of 4, 3, 2—2, 3, 4, and large scales.

25. *Spinibarbus hollandi* sp. nov. (Plate L, Fig. 3; Plate LI, Fig. 1).

Head 3.8 in length; depth 4; D. III, 8; A. II, 5; P. 16; V. 9; width of head 1.85 in its length; eye 7 in head; interorbital space 3, snout 3; pectoral 1.25; ventral 1.33; twenty-six scales in the lateral line, four in an oblique series between origin of dorsal and lateral line, four between the latter and the middle of belly, three scales between lateral line and the root of the ventral; pharyngeal teeth 5, 3, 2—2, 3, 5; gill-rakers 4 + 9.

Body elongate, more or less compressed; head elongate, pointed, top compressed, with many mucous cavities around the orbit; snout long, pointed; eyes rather small, superior and anterior; nostrils close together, in front of eye above; mouth inferior, its angle not reaching the orbit; lips fleshy, rather thin; upper jaw very slightly longer than the lower; barbels four, the rostral reaching the orbit, much slenderer and shorter than the maxillary which is nearly as long as the snout; interorbital space broad and flattened; gill-openings moderate; gill-rakers short and fleshy.

Dorsal fin inserted nearer tip of snout than the base of caudal, spines smooth, not serrated, anterior dorsal ray the longest; a recumbent spine in front of the dorsal, pointing forwards, its basal portion hidden by the scales; the pectoral reaching beyond two-thirds the distance to ventral; origin of ventral one scale behind that of the dorsal; anal fin entirely behind the dorsal, inserted midway between origin of ventral and base of caudal; caudal fin deeply forked, the tip of each lobe pointed; caudal peduncle elongate, its depth 2.5 in head.

Body covered with large cycloid scales; ventral fin with scaly flaps; lateral line continuous, slightly decurved anteriorly, extending along the middle of sides.

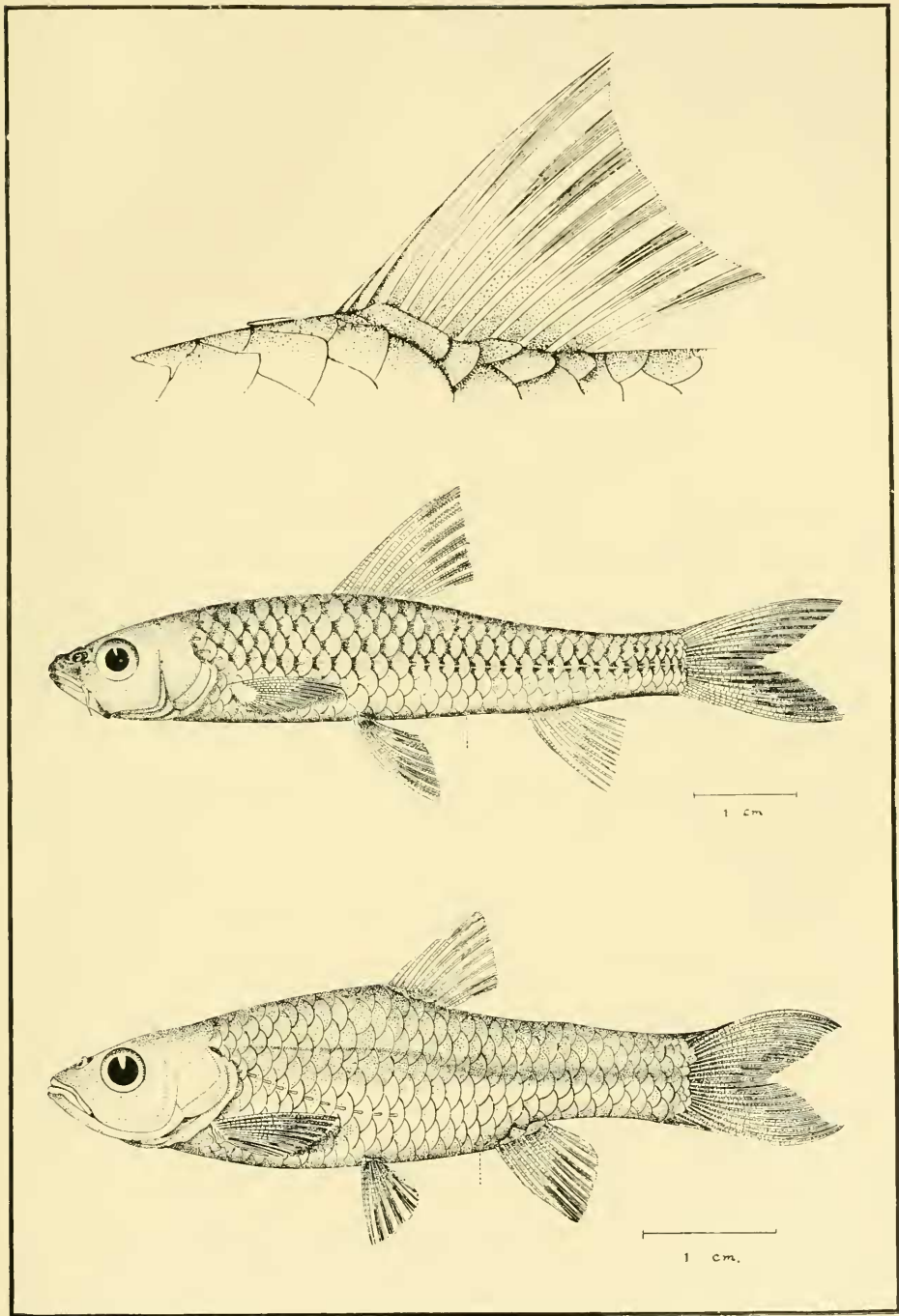
Color in formalin grayish brown above, paler below; sides and lower parts silvery; edge of the dorsal fin with a series of dark streaks, the rest of the fins dusky.

Total length 340 mm.

Described from a specimen from Sobun River near Tabani, collected by T. Aoki in December, 1916.

Habitat: Sobun River near Tabani (four specimens).

Remarks: Named for Dr. W. J. Holland, Director of the Carnegie Institute, Pittsburgh, U. S. A.



Recumbent spine of *Spinibarbus hollandi*.

Gnathopogon iijima Oshima, sp. nov.

Phoxiscus kikuchii Oshima, sp. nov.

MEASUREMENTS OF *Spinibarbus hollandi*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Sobun River.....	3.80	4	III, 8	2, 5	16	9	1.85	3	3	7	4-26-4	340
Sobun River.....	3.85	4	III, 8	2, 5	16	9	1.60	2.66	3	6	4-27-4	215

Genus GNATHOPOGON Bleeker.

- 1860. *Gnathopogon* BLEEKER, Ichth. Archipel. Indic. Prodr., II, p. 434. (Type *Capoeta elongata* Temminck & Schlegel.)
- 1872. *Squalidus* DYBOWSKI, Verh. Zool.-Bot. Ges. Wien, XXII, p. 215. (Type *Squalidus chankznesis* Dybowski.)
- 1896. *Leucogobio* GÜNTHER, Ann. Ac. Sci. Petersb., p. 212. (Type *Leucogobio hersensteini* Günther.)

Body elongate, compressed; abdomen not carinated. Scales of moderate size; lateral line continuous, running along the middle of the tail. Mouth anterior and oblique, with a minute maxillary barbel at the corner; both jaws with simple, narrow lips. Dorsal fin short, without spine, inserted in front of, or behind, that of the ventral. Anal fin short, with not more than six branched rays. Gill-rakers rudimentary; pharyngeal teeth 5, 3 or 2 or 1—1 or 3, 5, slightly hooked.

Distribution: Formosa; China; Corea; Japan; Amur Provinces.

26. *Gnathopogon iijimæ* sp. nov. (Plate LI, Fig. 2).

Head 3.70 in length; depth 4.85; D. 3, 7; A. 2, 6; P. 16; V. 7; width of head twice in its length; eye three times in head; interorbital space 3.6; snout 3; pectoral 1.3, thirty-three scales in the lateral line, four scales in an oblique series between origin of dorsal and lateral line, four scales between the latter and the middle of belly; pharyngeal teeth 5, 3—3, 5; gill-rakers rudimentary; five branchiostegals.

Body elongate, compressed, abdomen not carinated; head moderate, its top more or less convex; snout pointed anteriorly, its tip swollen, interorbital space rather flat, with bony ridge along superior margin of the orbit; mouth oblique, with very thin lips; upper jaw longer than the lower; barbels two, maxillary, minute, about half as long as the diameter of eye; eyes large, superior and slightly anterior; nostrils close together, nearer to eye than to tip of snout.

Origin of the dorsal slightly nearer the tip of snout than the base of caudal, first simple ray very short, the second about half as long as the third, anterior divided ray the longest, nearly as long as the head;

pectoral scarcely reaching the base of ventral; ventral fin opposite the dorsal, inserted beneath the first branched dorsal ray; anal entirely behind the dorsal, anterior ray the longest; caudal fin deeply emarginate, tip of each lobe sharply pointed; the depth of caudal peduncle 2.83.

Body covered with thin cycloid scales; lateral line continuous, extending along the middle of the tail, slightly decurved.

Color in alcohol pale yellowish gray above, lower parts whitish; most of the scales speckled with black; top of the head rather dark; dorsal fin white, each ray with black spots; caudal fin dusky, spotted with black; other fins whitish.

Total length 79 mm.

Described from a specimen from Tozen River, collected by T. Aoki in December, 1916.

Habitat: Tozen River (a single specimen).

Remarks: Named for Prof. Isao Iijima of the Science College, Imperial University of Tokyo.

This species resembles *Gnathopogon coreanus* (Berg)⁵ from Corea, but has shorter barbels and thirty-three scales instead of thirty-five in the lateral line.

Genus PSEUDOGOPIO Bleeker.

1863. *Pseudogobio* BLEEKER, Atlas Ichthyol., Cyprin., p. 29. (Type *Gobio esocinus* Temminck & Schlegel.)

Body elongate, rather slender and tapering behind. Head elongate, pointed; snout long, concave above, and slightly produced, with its tip bluntly rounded; eye small, nearer posterior edge of opercle than tip of snout; mouth small, protractile downwards, inferior, the maxillary not reaching nostrils; lips broad, fleshy, and covered with well-developed papillæ; a rather short, thick maxillary barbel; teeth small, 6 or 5, 2-2, 5 or 6; interorbital space broad and concave. Intestine short. Peritoneum silvery. Scales moderate, cycloid, about forty-two. Origin of the dorsal nearer tip of snout than base of caudal; origin of anal far behind tip of depressed ventral; caudal emarginate; ventrals inserted well behind origin of dorsal. Lateral line almost straight or very slightly decurved and continuous. Dorsal and caudal with distinct narrow blackish cross-bands. (Jordan and Fowler.)

Distribution: Formosa; China; Japan.

⁵ *Leucogobio coreanus* Berg, Ann. Mag. Nat. Hist. (7), 1906, p. 394; River Sambau, Kyong-sang-do, Corea.

27. *Pseudogobio brevirostris* Günther.

1868. *Pseudogobio brevirostris* GÜNTHER, Cat. Fish., VII, p. 174; Formosa.

Head 4.44 in length; depth 5; D. 2, 7; A. 2, 6; P. 13; V. 8; width of head 1.5 in its length; eye 4 in head; interorbital space 3; snout 2; ventral 1.28; pectoral slightly longer than the head; thirty-eight scales in the lateral line, four and one-half scales in an oblique series between origin of dorsal and lateral line, five scales between the latter and the middle of belly; between lateral line and the root of the ventral two scales; pharyngeal teeth 5-5; twenty-seven gill-rakers on first arch.

Body elongate, not compressed, dorsal profile nearly straight, abdomen rounded; head squarish, its top flat; snout pointed anteriorly, suddenly depressed in front of the nostrils, tip slightly swollen; mouth inferior, suctorial; upper lip distinctly fringed, lower lip densely tuberculated; each jaw with a transverse, sharp horny edge; eyes moderate, superior, and a little posterior; nostrils close together, anterior nostril in a short tube; interorbital space flat; pharyngeal teeth hooked; gill-rakers quite short, set very closely.

Origin of the dorsal much nearer the tip of snout than the base of caudal, in advance of that of the ventral, its longest ray nearly as long as the head; pectoral fin horizontal, extending beyond the origin of dorsal, middle rays longer; the ventral inserted beneath the middle of base of dorsal; anal fin moderate, second branched ray the longest; caudal fin emarginate, tip of each lobe obtusely pointed.

Scales rather large, thin, with radiated striæ and concentric rings; lateral line continuous, nearly straight, extending along the middle of the sides.

Color in alcohol pale grayish brown above; lower part of sides and belly whitish, with a longitudinal black band along the lateral line, all the fins whitish, roughly speckled with brown; top of head uniformly gray.

Total length 92 mm.

The present description is from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1916.

Habitat: Tamusui River (four specimens).

Remarks: The nearest relative of the present species is *Pseudogobio sinensis*⁶ from China. It differs, however, in having fewer scales in

⁶ *Tylognathus sinensis* Kner, Novara Fisch., III, 1865, p. 354; Shanghai, China.

Pseudogobio sinensis Günther, Cat. Fish., VII, 1868, p. 175; Shanghai (after Kner).

the lateral line (36-37) and six scales between origin of dorsal and lateral line.

MEASUREMENTS OF *Pseudogobio brevirostris*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length. Min.
Tamusui River.....	4.44	5	2, 7	2, 6	13	8	1.50	3	2	4	4 $\frac{1}{2}$ -38-5	92
Tamusui River.....	5	4.64	2, 7	2, 6	13	8	1.42	3	2	4	4 $\frac{1}{2}$ -39-5	94

Genus PSEUDORASBORA Bleeker.

1860. *Pseudorasbora* BLEEKER, Act. Soc. Indo-Neerl., VI, p. 97. (Type *Leuciscus parvus* Temminck & Schlegel.)

Body elongate. Head pointed, compressed; snout bluntly pointed; eye rather large; mouth terminal, above, oblique, and mandible projecting and the maxillary not reaching nostril; no barbels; teeth 5-5; interorbital space broad and flat. Inside of gill-openings with a notch below. Intestine short. Peritoneum silvery. Scales large, cycloid, and about thirty-eight in lateral line; breast scaled. Origin of dorsal nearer tip of snout than base of caudal; origin of anal begins below origin of the depressed dorsal; caudal emarginate; ventrals inserted below origin of dorsal. Lateral line slightly decurved and continuous. Breeding males with the snout and sides of the head with horny tubercles (Jordan and Fowler).

Distribution: Formosa; China; Amur Province; Corea; Japan.

28. *Pseudorasbora parva* (Schlegel).

Moroko or Haya (Japan); Chasui or Bohoe (Formosa).

1846. *Leuciscus parvus* SCHLEGEL, Fauna Japonica, Poiss., p. 215, Pl. CII, Fig. 3; streams near Nagasaki.
1846. *Leuciscus pusillus* SCHLEGEL, *l. c.*, p. 216, Pl. CII, Fig. 4.
1867. *Pseudorasbora parva* KNER, Novara, Fisch., III, p. 355, Pl. XVII, Fig. 2; Shanghai.—GÜNTHER, Cat. Fish., VII, 1868, p. 186; Japan; China.—BLEEKER, Mem. Cyprin. Chine, 1871, p. 11; Shanghai; Tji-kiang.—GÜNTHER, Ann. Mag. Nat. Hist., Sept., 1873, p. 247; China.—ISHIKAWA, Zool. Mag. Tokyo, VII, 1875, p. 128; Otsu; Maebara; Matsubara.—PETERS, Monatsb. Ak. Berlin, 1880, p. 925; China.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, 1900, p. 344; Lake Biwa.—JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, 1903, p. 840; Tsuchiura; Nagoya; Lake Yogo; Lake Biwa; Iwai River; Chikugo River; Yodo River.—SMITH & POPE, Proc. U. S. Nat. Mus., XXXI, 1905, p. 461; Japan.—JORDAN & METZ, Mem. Carneg. Mus., VI, No. 2, 1913, p. 16; Suigen, Corea.—Berg. Ichthyol. Amur, p. 94; Amur Province

Head 4 in length; depth 4; D. 3, 7; A. 2, 6; P. 14; V. 8; width of head 1.78 in its length; eye 3.66 in head; interorbital space 2.5; snout 3; pectoral 1.25; ventral 1.25; thirty-eight scales in the lateral line, five scales in an oblique series between origin of dorsal and lateral line, five scales between the latter and the middle of belly, three scales between lateral line and the root of ventral; pharyngeal teeth 5-5; gill-rakers rudimentary, merely fleshy rudiments.

Body elongate, compressed; head triangular, pointed, compressed, upper surface more or less compressed, interorbital space rather broad; snout truncated in front, anterior part very slightly swollen; mouth anterior, transverse, its angle not reaching the nostril; upper lip rather thick and fleshy; lower jaw projecting, with horny anterior edge; eyes large, slightly anterior and superior; nostrils together, in front of eye above; no barbel; gill-openings moderate; peritoneum silvery.

Origin of the dorsal nearer tip of snout than base of caudal, one scale in advance of that of the ventral, first single ray minute, the second about half as long as the third, anterior divided ray the longest; pectorals elongate; but not reaching the root of the ventral; ventrals beneath the dorsal; anal fin entirely behind the dorsal, its origin much

MEASUREMENTS OF *Pseudorasbora parva*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head	Interorbital.	Snout.	Eye.	Scales	Length, Mm.
Taihoku.....	4	4	3, 7	2, 6	14	8	1.77	2.50	3	3.66	5-38-5	77
Taihoku.....	4	4	3, 7	2, 6	14	8	2	2.50	3	3.75	5-36-5	75
Taihoku.....	4	4	3, 7	2, 6	13	8	1.75	2.33	3	3.50	5-36-5	70
Taihoku.....	4	4	3, 7	2, 6	13	8	1.77	2.28	3	3.66	5-37-5	77
Taihoku.....	4.28	4	3, 7	2, 6	13	8	1.75	2.33	3	3.50	5-37-5	71
Taihoku.....	4	3.87	3, 7	2, 6	13	8	1.75	2.33	3	3.80	5-36-5	69
Raupi.....	3.6	4	3, 7	2, 6	13	8	2	3	3	4	5-36-5	47
Raupi.....	3.4	4	3, 7	2, 6	13	8	2	3	3	3.50	5-36-5	38
Rigyokutsu.....	4.25	4.14	3, 7	2, 6	14	8	1.82	2.50	2.86	4	5-36-5	100
Shori.....	4.5	3.64	3, 7	2, 6	13	8	1.64	2.25	3	3.80	5-38-5	96
Shori.....	4.5	3.5	3, 7	2, 6	14	8	1.54	2.13	3	3.66	5-36-5	93
Ako.....	4.29	4.11	3, 7	2, 6	13	8	1.80	2.37	2.71	3.66	5-35-5	88
Shinchiku.....	4.5	3.29	3, 7	2, 6	13	8	1.89	2.37	3	3.66	5-37-5	88
Bokusekikaku.....	4	3.60	3, 7	2, 6	13	8	1.75	2.36	2.66	4	5 ₁ -38-6	75

nearer to that of the ventral than base of the caudal; caudal fin bifurcate, tip of each lobe sharply pointed.

Body covered with rather large cycloid scales; lateral line very slightly decurved, extending along the middle of the sides.

Color in alcohol dark grayish above, sides beneath lateral line and lower surface silvery; a slaty gray lateral band along the middle of sides; most of the scales with black edges; all the fins grayish.

Total length 77 mm.

Described from a specimen from Taihoku, collected by Oshima in December, 1916.

Habitat: The present species is very abundant in pools and rivers in Formosa. I have a number of specimens from the Tamusui River; Taihoku; Raupi, Giran; Tozen River; Nanto; Rigyokutsu, Nanto; Shinchiku; Ako; Shori, Toyen; Bokusekikaku.

Remarks: The length of head and the depth of body are variable.

Genus PARARASBORA Regan.

1908. *Pararasbora* REGAN, Ann. Mag. Nat. Hist. (8), II, p. 360. (Type *Pararasbora moltrechti* Regan.)

Scales large, 5-6 scales in an oblique series between origin of dorsal and lateral line, 2 scales between the latter and the root of ventral. Lateral line decurved, running along the lower part of the tail. Dorsal fin with seven branched rays, inserted behind the ventral; the anal entirely behind the dorsal, with seven branched rays. Mouth oblique, its angle extending to the anterior border of the orbit; lower jaw slightly shorter than the upper, with no prominence in front, upper jaw entire, with no emargination. Barbels none. Gill-rakers rudimentary. Pharyngeal teeth in two series, 4, 4-4, 4.

Distribution: Formosa.

29. *Pararasbora moltrechti* Regan.

Baahii (Formosa).

1908. *Pararasbora moltrechti* REGAN, Ann. Mag. Nat. Hist. (8), II, p. 360; Lake Candidius, Formosa.

1909. Jordan & Richardson, Mem. Carneg. Mus., IV, No. 4, 1909, p. 170; Lake Candidius (after Regan.)

Head 4.11 in length; depth 4; D. 3, 7; A. 2, 7; P. 14; V. 7; width of head 1.75 in its length; eye 3.25 in head; interorbital space 2.1; snout 3.25; pectoral 1.2; ventral 1.4; thirty-six scales in the lateral line, six scales in an oblique series between origin of dorsal and lateral line, two scales between the latter and the root of ventral, four scales between lateral line and the middle of belly; pharyngeal teeth 4, 4-4, 4; gill-rakers 2 + 6, rudimentary.

Body elongate, compressed; dorsal and ventral profiles equally

arched; head moderate, pointed anteriorly, upper surface more or less depressed; snout bluntly pointed, interorbital space broad and flattened; mouth oblique, its angle reaching beneath the anterior border of orbit; upper lip thin; lower jaw slightly shorter than the upper, with a sharp edge; five branchiostegals; nostrils close together, in front of the eye above.

Origin of dorsal nearer to base of caudal than tip of snout, inserted above the space between the ventral and anal, anterior ray longest; pectoral fin not reaching the ventral, origin of ventral much in advance of that of dorsal; anal fin entirely behind the dorsal, its origin nearer to that of ventral than base of caudal, its base covered with a series of scales; caudal fin emarginate, tip of each lobe obtusely pointed; caudal peduncle elongate, its depth about twice in the length of head.

Body covered with rather large cycloid scales; lateral line much decurved, running along the lower half of the tail.

Color in formalin dark gray above, lower parts yellowish white; top of head black; a dark brown stripe from occiput to base of the caudal above, running along the dorsal median line; side with a broad dark brown lateral band, distinct posteriorly; all the fins grayish.

Total length 83 mm.

The present description is drawn from a specimen from Jitsugetsutan, collected by T. Aoki in August, 1916.

Habitat: Restricted to Jitsugetsutan (Lake Candidius). Two specimens.

MEASUREMENTS OF *Pararasbora moltrechti*.

Locality.	Head.	Dej. th.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Jitsugetsutan	4.11	4	3, 7	2, 7	14	7	1.75	2.11	3.25	3.25	6-36-4	83
Jitsugetsutan	4.13	4	3, 7	2, 7	14	7	1.88	2.25	3.20	4	6-35-4	81

PHOXISCUS gen. nov.

Body elongate, compressed; postventral part keeled. Head moderate, its top rather flat; snout obtusely rounded. Mouth oblique; lower jaw slightly longer than the upper; lips thin, normal. Barbels none. Teeth hooked, in double series, 5, 3-4, 4. Lateral line incomplete, visible only in the anterior part of the body. Scales large, about thirty in a lateral series. Dorsal fin short, without osseous spine, inserted behind the origin of the ventral; anal fin of moderate

length, with seven branched rays, not extending forwards to below the dorsal.

Distribution: Formosa.

Remarks: The present genus is closely related to *Illemitremia* Cope. It differs, however, in having three and four teeth in the second row, instead of two as in the latter, as also in the carinate belly.

30. **Phoxiscus kikuchii** sp. nov. (Plate LI, Fig. 3).

Head 3.5 in length; depth 3.5; D. 2, 7; A. 2, 7; P. 13; V. 7; width of head 1.75 in its length; eye four in head; interorbital space 2.33; snout 3; pectoral 1.5; ventral 1.75; thirty scales in a lateral series, five scales in an oblique series between origin of dorsal and lateral line, six scales between the latter and the middle of belly, two scales between lateral line and the root of ventral; pharyngeal teeth 5, 3—4, 4; gill-rakers 2 + 5.

Body elongate, compressed, postventral part weakly keeled; head moderate, its top rather flat; snout obtusely rounded anteriorly, interorbital space broad, more or less convex; mouth oblique, with thin lips; lower jaw slightly longer than the upper; no barbel; maxillary scarcely reaching a vertical through anterior border of orbit; eye moderate, superior and anterior; nostrils close together, the anterior in a short tube; pharyngeal teeth slender and hooked; gill-rakers on the first arch short and separated.

Dorsal fin short, nearer the base of caudal than the tip of snout, anterior ray the longest, its height 1.4 in length of head; pectoral fin not reaching the ventral, with a small fleshy flap; the ventral inserted in front of the origin of dorsal, rather slender; anal fin entirely behind the dorsal, rather short, anterior ray the longest, its height 1.66 in head; caudal fin emarginate, tip of each lobe pointed.

Body covered with large imbricated scales; lateral line incomplete, decurved, reaching posterior third of the ventral.

Color in alcohol brownish gray above, lower parts yellowish; top of head and dorsal median line purplish; sides with a bluish gray longitudinal band; all the fins uniformly cream-colored.

Total length 60 mm.

Described from a specimen from Bokusekikaku, collected by Yonetaro Kikuchi of the Taihoku Museum.

Habitat: Bokusekikaku (a single specimen).

Remarks: Named for Yonetaro Kikuchi, collector of the Taihoku Museum.

Genus *DISTÆCHODON* Peters.

1880. *Distæchodon* PETERS, Monatsb. Königl. Ak. Wiss. Berlin, p. 924. (Type *Distæchodon tumirostris* Peters.)

Scales large; lateral line decurved, running along the middle of the tail. Dorsal fin short, with seven branched rays and two smooth spines, opposite the ventral. Anal fin of moderate length, with nine branched rays, not extending forwards to below the dorsal. Abdomen not carinated. Snout swollen, produced anteriorly, tip of its skin overlapping the upper lip. Mouth subinferior, transverse. Upper lip with a transverse inner fold; anterior border of the lower jaw rather sharp. Barbels none. Gill-rakers setiform, set very closely; pharyngeal teeth 7, 3—3, 7, compressed, with grinding surface.

Distribution: China; Formosa.

31. *Distæchodon tumirostris* Peters.

Gonhii (Formosa).

1880. *Distæchodon tumirostris* Peters, Monatsb. Königl. Ak. Wiss. Berlin, p. 925; Ningpo, China.

Head 4.64 in length; depth 3.92; D. II, 7; A. 3, 9; P. 17; V. 9; width of head 1.80 in its length; eye four in head; interorbital space 2.5; snout 3; pectoral 1.28; ventral 1.5; seventy-two scales in the lateral line, thirteen scales in an oblique series between origin of dorsal and lateral line, ten scales between the latter and the middle of belly, six scales between lateral line and the root of ventral; pharyngeal teeth 7, 3—3, 7; gill-rakers on the first arch 75.

Body elongate, compressed, dorsal profile slightly depressed at the occiput, abdomen rounded, not carinated; head rather small, triangular, its top more or less convex, profile on the nape concave; interorbital space broad, rather flat; snout obtusely rounded anteriorly, the tip swollen, the end of its skin overlapping the upper lip; no barbel; mouth subinferior, transverse; upper lip fleshy, not fringed, with a thin inner fold, lower jaw nearly as long as the upper, with a sharp anterior edge, lower lip not continuous; a deep oblique fissure, crossing the angle of mouth and extending downwards and backwards to the vertical from the nostril; eye large, anterior; nostrils close together, in front of eye above; pharyngeal teeth on the outer row very strong, with grinding surface and sharply pointed tip, strongly compressed laterally, those on the inner row exceedingly small and slender, with grinding surface; gill-rakers minute, setiform, set very closely.

Origin of dorsal midway between tip of snout and base of caudal, armed with two strong osseous smooth spines, opposite the ventral; pectorals reaching midway of the distance to origin of ventral, with a fleshy flap; ventral rather slender, with a scaly flap; anal fin entirely behind the dorsal, short, anterior ray the longest; caudal fin bifurcate, tip of each lobe pointed; caudal peduncle rather long, its depth 2.25 in length of head.

Body covered with uniform cycloid scales; lateral line slightly decurved, extending along the middle of the tail.

Color in formalin uniform dark gray above, paler below; lower parts silvery; pectoral, dorsal, and caudal fins dusky, other fins whitish.

Total length 230 mm.

Described from a specimen from Giran.

Habitat: Tailhasho, Giran. (Two specimens).

Genus ISCHIKAUIA Jordan & Snyder.

1901. *Ischikauia* JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, p. 346. (Type *Opsariichthus steenackeri* Sauvage.)

Body compressed; caudal peduncle deep. Mouth oblique; lower jaw slightly projecting; maxillary freely protractile, not extending to edge of orbit; no barbels. Teeth, all slightly hooked, with a narrow grinding surface; in three rows; three or four on first, or outer row, five on second, two on third, or inner row. Pseudobranchiæ present. Gill-rakers on first arch 13 + 4; low, pointed. Alimentary canal twice as long as body. Air bladder in two divisions, extending posteriorly to vent. Peritoneum with black pigment. Scales of moderate size, about sixty-five in lateral line; thirteen from lateral line to insertion of dorsal. Lateral line sharply decurved anteriorly, gradually curving upward and extending posteriorly along middle of caudal peduncle. Dorsal inserted a little behind origin of ventrals, composed of nine rays; first ray short, and closely adnate to the next; second ray, spine-like, strong; the other rays branched. Seventeen anal rays; the first two spine-like, weak. Caudal forked, the tips sharp. Pectorals pointed. (Jordan & Snyder.)

Distribution: Formosa; Indo-China; Japan.

32. *Ischikauia macrolepis* Regan.

1908. *Ischikauia macrolepis* REGAN, Ann. Mag. Nat. Hist. (8), 1, p. 150; Kagi, Formosa.

Depth of body 3.33 in the length, length of head 4. Snout a little shorter than eye, the diameter of which is 3.25 to 3.50 in the length

of head and less than the interorbital width. Mouth oblique. Dorsal rays ten, seven branched, its origin behind the ventrals and nearer to the base of caudal than to the end of snout. Anal rays sixteen to seventeen, thirteen or fourteen branched. Pectoral extending to the ventrals. Thirty-eight to forty scales in a longitudinal series, seven or eight in a transverse series from origin of dorsal to lateral line, three between lateral line and base of ventral.

Three small specimens, the largest 60 mm. in total length, from Kagi, Formosa, collected by Herr Sauter. This species is very similar to the Japanese *I. steenackeri* (Sauvage), which, however, has much smaller scales. (Regan.)

Habitat: Kagi. (Regan.)

Remarks: Not seen.

Genus CTENOPHARYNGODON Steindachner.

1866. *Ctenopharyngodon* STEINDACHNER, Verh. Zoöl.-Bot. Ges. Wien, p. 782.
(Type *Leuciscus idella* Cuv. & Val.)

Body oblong. Scales of moderate size; lateral line complete, running nearly into the middle of the side of tail. Dorsal fin short, without spine, opposite the ventral, anal fin short. Mouth of moderate width, anterior, with upper jaw somewhat longer. Both jaws with simple lips, the lower distinct at the angle of the mouth only. Upper jaw slightly protractile. Barbels none. Gill-rakers rather short, lanceolate, rather widely set. Pseudobranchiæ present. The attachment of the branchial membrane to the isthmus takes place behind a vertical from the orbit. Pharyngeal teeth 5, 2—2, 5, those of the outer series very strong, strongly compressed, with the outer layer deeply folded. (Günther.)

Distribution: Formosa; China; Amur Province.

33. *Ctenopharyngodon idellus* (Cuv. & Val.).

Tsauhii (Formosa).

1844. *Leuciscus idella* CUV. & VAL., Hist. Nat. Poiss., XVII, p. 362.—RICHARDSON, Ichthyol. China, 1846, p. 297; Canton.—BLEEKER, Mem. Cyprin. Chine., 1871, p. 47; Canton; Yang-tze-kiang.
1855. *Leuciscus tschiliensis* BASILEWSKY, Nouv. Mem. Soc. Nat. Mosc., X, p. 233; Northern China.
1866. *Ctenopharyngodon laticeps* STEINDACHNER, Verh. Zoöl.-Bot. Ges. Wien, p. 782, Taf. XVIII, Figs. 1-5; Hongkong.
1868. *Ctenopharyngodon idellus* GÜNTHER, Cat. Fish. VII, p. 261, China.—Ann. Mag. Nat. Hist., Sept., 1873, Shanghai.—PETERS, Monatsb. Königl. Ak.

Berlin, 1880, p. 926; China.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 322; Taihoku, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, 1909, No. 4, p. 169; Formosa.—BERG, Ichthyol. Amur., 1909, p. 120; Amur.

Head 4.09 in length; depth 3.4; D. 3, 7; A. 3, 7; P. 18; V. 9; width of head 1.33 in its length, eye 6 in head; interorbital space 1.8; snout 2.5; pectoral 1.33; ventral 1.71; forty scales in the lateral line, seven scales in an oblique series between origin of dorsal and lateral line, five scales between the latter and the root of ventral, eight between lateral line and the middle of belly; pharyngeal teeth 5, 2—2, 5; gill-rakers 6 + 10.

Body stout, dorsal and ventral profiles about equally arched, tail compressed, head small, flattened; snout broad and short, anterior margin obtusely rounded; mouth subinferior, its angle reaching a vertical through anterior border of the anterior nostril; upper jaw somewhat longer than the lower; upper lip rather thin, thicker in front; lower lip distinct at the angle of the mouth only; eyes moderate, superior and anterior; interorbital space very broad; nostrils together, in front of eye above; gill-membranes united, scarcely reaching to isthmus behind a vertical through the anterior border of orbit; gill-rakers long and slender, widely set; pharyngeal teeth of the outer row strong, laterally compressed, apical half comb-shaped, with a series of folds on both sides; those of the inner row very small, laterally compressed, the apical part comb-shaped.

Origin of dorsal slightly nearer tip of snout than base of caudal, anterior rays longer, pectorals reaching beyond half or the distance to ventrals; ventral rather small, inserted one scale behind the origin of dorsal; anal fin entirely behind the dorsal; its origin nearer to base of caudal than that of the ventral.

Body covered with large scales with radiating striæ and concentric rings; lateral line continuous, slightly decurved, extending along the middle of the sides.

Color in formalin uniformly gray above, paler below; lower parts and ventral fins whitish; upper surface of the pectoral dusky; other fins pale gray.

Total length 360 mm.

Described from a specimen from Shori, Toyen.

Habitat: Bred in ponds throughout the island.

Remarks: The present species is one of the important fresh-water

food-fishes among the Chinese people, though it is not a native of the Island. Every year larvæ of this fish are imported from Southern China and are bred artificially by Chinese farmers.

Genus ACHEILOGNATHUS Bleeker.

1860. *Acheilognathus* BLEEKER, Ichth. Archipel. Indic. Prodr., II, p. 228. (Type *Acheilognathus melanogaster* Bleeker.)

Body more or less deep and compressed; head short; eye more or less large; snout rather short and blunt; mouth small, the maxillary not reaching the eye; maxillaries each with a barbel; teeth 5-5, smooth, with a narrow grinding surface; interorbital space rather broad. Intestine long. Peritoneum black. Scales large, some of those on the sides imbricated, 36-39. Origin of the dorsal about midway in the length of the body without caudal, base of fin moderate, with eight to ten developed rays; caudal deeply emarginate; ventrals generally inserted a little before origin of dorsal. Lateral line slightly decurved, and continuous. (Jordan and Fowler.)

Distribution: Formosa; China; Corea; Amur Province; Japan.

34. *Acheilognathus himantegus* Günther.

1868. *Acheilognathus himantegus* GÜNTHER, Cat. Fish., VII, p. 277; Formosa.

Head 4.58 in length; depth 2.89; D. 2, 8; A. 2, 11; P. 12; V. 7; width of head 1.66 in its length; eye 2.66 in head; interorbital space 2; snout 3; pectoral 1.2; ventral 1.33; thirty-four scales in the lateral line, six scales in an oblique series between origin of dorsal and lateral line, four scales between the latter and the middle of belly, three scales between lateral line and the root of the ventral; pharyngeal teeth 5-5; gill-rakers 3 + 9.

Body compressed, rather deep; head small, its top convex, with a median horny ridge; snout short, obtusely rounded anteriorly, its tip with a bony prominence, tip of its skin overlapping the upper lip; interorbital space broad, interspace between nostrils swollen; mouth subinferior and oblique, its angle reaching the nostrils below; lips thin; lower jaw slightly shorter than the upper; two maxillary barbels; eyes moderate, slightly anterior and superior; nostrils close together, in front of eye above.

Origin of dorsal midway between tip of snout and base of caudal, much behind that of the ventral, anterior rays longer; pectoral fin not reaching the ventral; ventral slender, scarcely reaching the root of anal; anal fin inserted below the middle of dorsal, elongate, its origin

nearer to base of pectoral than the base of caudal; caudal fin emarginate, the tip of each lobe sharply pointed; caudal peduncle rather long, its depth 1.6 in length of head.

Scales moderate, with a black marking at the tip; lateral line strongly decurved on the trunk, extending along the lower part of the tail.

Color dark gray above, paler below; lower part of the sides sky-green; a short yellow lateral band on the nape; a black lateral band runs along the middle of the tail, terminating in a black band-like spot between the middle caudal rays; interspace between each dorsal ray with a black streak; dorsal and anal fins pinkish, the other fins dusky; no black spot on the shoulder.

Total length 67 mm.

The present description is from a specimen from Taihoku, collected by Oshima in September, 1916.

Habitat: Taihoku; Wodensho, Taichu; Shimotamusui River.

Remarks: The nearest relative of the present species is *Acheilognathus cyanostigma* Jordan & Fowler⁷ from Japan. It differs from *A. himantegus* in having shorter barbel, smaller number of anal rays, and thirty-nine scales instead of thirty-four in lateral line.

MEASUREMENTS OF *Acheilognathus himantegus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interior-bital.	Snout.	Eye.	Scales.	Length, Mm.
Taihoku.	4.58	2.89	2, 8	2, 11	12	7	1.66	2	3	2.66	6-34-4	67
Taihoku.	4.33	2.74	2, 8	2, 11	12	7	1.71	2.16	3	2.66	6-34-4	67
Taihoku.	4.58	2.84	2, 8	2, 12	12	7	1.71	2.16	3	3	6-34-4	67
Taihoku.	4.45	2.72	2, 8	2, 11	12	7	1.71	2	3.33	2.66	6-34-4	62
Taihoku.	4.27	2.87	2, 8	2, 10	12	7	1.71	2.40	3	3	6-33-4	58
Taihoku.	4.55	3	2, 8	2, 11	12	7	1.80	2.25	3	3	6-34-4	53
Shimotamusui River.	4.30	2.58	2, 8	2, 11	12	7	1.83	2.20	3	3	6-34-4	57
Shimotamusui River.	4.20	3	2, 8	2, 11	12	7	1.83	2.25	3	3	6-34-4	53
Shimotamusui River.	4	3	2, 8	2, 11	12	7	1.75	2.50	3	3	6-34-4	35
Wodensho.	4	3	2, 8	2, 11	12	7	1.60	2.33	3	3	6-34-4	39

Genus RHODEUS Agassiz.

1835. *Rhodeus* AGASSIZ, Mem. Soc. Hist. Neuchat., I, p. 37. (Type *Cyprinus amarus* Bloch.)

Scales of moderate size; lateral line incomplete, only on the anterior part of the trunk. Dorsal fin with from nine to twelve branched rays,

⁷ *Acheilognathus cyanostigma* Jordan & Fowler, Proc. U. S. Nat. Mus., XXVI, 1903, p. 820; Lake Biwa; Lake Yogo.

extending from the ventrals to beyond the origin of the anal. Anal fin rather elongate, with about twelve rays. Mouth subinferior, small, arched; lower jaw without labial fold. Barbels none. Gill-rakers very short; pseudobranchiæ. Pharyngeal teeth 5-5, compressed, not denticulated, the bevelled surface with a simple groove.

Male, during the spawning season, with tubercles on the snout, and the female with a long external urogenital tube. (Günther).

Distribution: Europe; Caucasus; China; Formosa; Basin of Amur; Corea; Japan.

35. *Rhodeus ocellatus* (Kner).

1859. *Pseudoperilampus* (?) *ocellatus* KNER, Novara, Fisch., III, p. 365, Taf. 15, Fig. 6; Shanghai.
1868. *Rhodeus ocellatus* GÜNTHER, Cat. Fish., VII, p. 280; China.—BLEEKER, Mem. Cyprin. Chine., 1871, p. 34, Pl. VI, Fig. 3; Yang-tze-kiang.—GÜNTHER, Ann. Mag. Nat. Hist., Sept., 1873, p. 249; Shanghai.—JORDAN & SEALE, Proc. U. S. Nat. Mus., XXIX, 1905, p. 518; Shanghai.—JORDAN & METZ, Mem. Carneg. Mus., VI, 1913, p. 20; Suigen, Corea.

Head 4.23 in length; depth 2.28; D. 2, 12; A. 2, 13; P. 11; V. 6; width of head 2 in its length; eye 3 in head; interorbital space 2.5; snout 3; pectoral 1.25; ventral 1.33; thirty-four scales in a longitudinal series, thirteen scales in an oblique series between origin of dorsal and the middle of belly; pharyngeal teeth 5-5; gill-rakers 2 + 10.

Body much compressed, deep and rhomboidal; head small, its dorsal profile slightly concave above the eyes; snout as long as the diameter of eye, tip obtusely rounded, with a bony oval swelling, which is provided with a number of minute tubercles, more or less overlapping the upper lip; interorbital space broad, rather flat; mouth subinferior, rather transverse, its angle reaching the anterior border of nostril below; lower jaw slightly shorter than the upper; no barbel; nostrils close together, approximated to eyes, posterior nostril widely opened; pharyngeal teeth compressed, the sides not serrated, with a grinding surface.

Dorsal fin elongate, its origin nearer tip of snout than base of caudal, inserted behind the origin of ventral, base of the fin one and one-third times as long as the head; pectoral fin reaching to within a short distance to ventral; the ventral slender, scarcely reaching the origin of anal; anal fin elongate, inserted beneath the middle of the base of dorsal, anterior ray longest; caudal fin deeply emarginate, the tip of each lobe pointed.

Scales moderate, imbricated; lateral line incomplete, visible only on four or five scales near gill-openings.

Color dark gray above, paler below; lower parts of the sides bluish anteriorly; scales on the back and sides with black edges; a black lateral band runs along the middle of the posterior half of the side, commencing near the origin of the dorsal below; a black spot above the gill-opening and a dusky cross-bar on the shoulder; dorsal and caudal fins dusky, the pectoral and ventral whitish, anal fin pinkish.

Total length 68 mm.

Described from a specimen from Taihoku, collected by Oshima in September, 1916.

Habitat: Abundant in the ponds and rivulets near Taihoku. My specimens came from Taihoku and Nanto.

MEASUREMENTS OF *Rhodeus ocellatus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Min.
Taihoku.....	4.23	2.28	2, 12	2, 13	11	6	2	2.50	3	3	34-13	68
Taihoku.....	3.91	2.60	2, 11	2, 11	10	7	2	2.50	3	3	34-11	55
Taihoku.....	3.90	2.29	2, 12	2, 12	11	6	2	2.50	3.50	3	34-11	50
Taihoku.....	3.80	2.37	2, 12	2, 12	11	7	2	2.33	3	3	34-11	48
Taihoku.....	4	2.52	2, 12	2, 12	11	6	2	2.33	3.66	3	34-11	46
Taihoku.....	3.80	2.22	2, 12	2, 12	11	6	2	2.50	3.50	3	34-11	50
Nanto.....	4.40	2.25	2, 12	2, 11	10	7	2	2.33	3	3	32-11	55

Genus ZACCO Jordan & Evermann.

1902. Zacco JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 322. (Type *Leuciscus platypus* Temminck & Schlegel.)

Body moderately elongate and compressed; head compressed; snout conical, pointed; eyes moderate; mouth oblique, not notched; no barbels; teeth 5 or 4, 4, and 2 or 1—1 or 2, 4 and 4 or 5; interorbital space convex. Intestine short. Peritoneum black. Scales cycloid, narrowly imbricated, forty to sixty in the lateral line. Dorsal nearer tip of snout than base of caudal, or midway between, its developed rays seven; anal inserted below, or a trifle before, tip of depressed dorsal; its basis long, and composed of nine or ten developed rays; caudal emarginate; pectorals sometimes reaching ventrals; ventrals inserted a little before or below the origin of dorsal. Lateral line continuous and decurved. Breeding males have the head, the lower surface of the caudal peduncle, and the anal fin furnished with horny

tubercles, not as numerous as those in *Opsariichthys*, and larger in proportion. The anal fin also has the developed rays elongated and with adipose expansions. (Jordan & Fowler.)

Distribution: Japan; Corea; Formosa.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a. Scales in the lateral line 42-44; 8 scales between lateral line and the origin of dorsal; 2 scales between lateral line and the root of ventrals. *platypus*.
- aa. Scales in the lateral line 49-52; 9-10 scales between lateral line and the origin of dorsal; 3 scales between lateral line and the root of ventrals. *temmincki*.
- aaa. Scales in the lateral line 53-55; 12 scales between lateral line and the origin of dorsal; 4 scales between lateral line and the root of ventrals. *pachycephalus*.

36. *Zacco platypus* (Temminck & Schlegel).

Oikawa, Haya or Hae (Japan); Chopien or Anoye (Formosa).

- 1846. *Leuciscus platypus* TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., p. 297, Pl. CI, Fig. 1; streams near Nagasaki.
- 1863. *Opsariichthys platypus* GÜNTHER, Cat. Fish., VII, p. 296; Japan & Formosa.—ISHIKAWA, Zool. Mag. Tokyo, 1895, p. 121; Hakone; Matsubara on Lake Biwa.—Prel. Cat., 1897, p. 11; Tega Lake; Tokyo; Chichibu; Lake Suwa; Lake Biwa; Kyoto; Tsuyama.—BOULENGER, Proc. Zool. Soc. London, 1899, p. 961; Hainan.
- 1900. *Barilius platypus* JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXII, p. 344; Lake Biwa.
- 1903. *Zacco platypus* JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, p. 851; Tsuchiura; Kinu River; Yodo River; Chikugo River; Yabe River; Tama River; Nagoya; Kawatana; Lake Biwa.—SMITH & COPE, Proc. U. S. Nat. Mus., XXXI, 1908, p. 462.—JORDAN & THOMPSON, Mem. Carneg. Mus., VI, no. 4, 1914, p. 232; Lake Biwa; Okayama.—SNYDER, Proc. U. S. Nat. Museum, XLII, p. 404; Takamatsu River.—JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 75; Japan.
- 1846. *Leuciscus macropus* TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., p. 209, Pl. CI, Fig. 2; Nagasaki.
- 1846. *Leuciscus minor* TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., p. 210, Pl. CI, Fig. 3; Nagasaki.
- 1903. *Zacco evolans* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 323; Taihoku, Formosa.

Head 4 in length; depth 3.71; D. II, 7; A. 3, 9; P. 15; V. 9; width of head 1.92 in its length; eye 4 in head; interorbital space 2.78; snout 3; ventral 1.32; pectoral a little longer than the head; forty-three scales in the lateral line, eight scales in an oblique series between origin of the dorsal and lateral line, four scales between the latter and the middle of belly, two scales between lateral line and the root of the ventral; pharyngeal teeth 5, 4, 1—1, 4, 5; gill-rakers 2 + 8.

Body elongate, compressed; dorsal profile more or less arched, head moderate, its top very slightly arched; snout bluntly pointed anteriorly; mouth oblique, its angle extending to a vertical through anterior border of orbit; lower jaw slightly shorter than the upper; eye moderate, superior; nostrils close together, in front of eye, anterior nostril in a short tube; lower part of pre-operculum and sides of the snout with a number of colorless tubercles; extremity of the snout, upper lip, and outer part of lower jaw with a series of minute tubercles.

Origin of dorsal nearer tip of snout than base of caudal, opposite the ventral, short, rather high, but not exceeding the length of head; pectoral elongate, extending beyond the root of ventral; ventral fin rather short, reaching the root of anal; anal fin elongate, its middle ray much longer than the head, when depressed reaching beyond the root of caudal, two or three of the anal rays provided with tubercles; caudal fin strongly bifurcated; depth of caudal peduncle 2.4 in length of head.

Scales thin and cycloid; lateral line decurved, extending along the lower half of the tail.

Color in alcohol brownish gray above, paler below; lower parts silvery; sides with about twelve dark cross-bars; membrane of dorsal and anal fins with a series of black streaks; dorsal and caudal fins dusky; the pectoral and ventral whitish.

Total length 120 mm.

Described from a specimen from Choso River near Koshiryō, collected by T. Aoki in August, 1917.

Habitat: Tamsuī River (Shinten and Heirinbi); Shinchiku; Choso River.

Remarks: In the year 1903, Jordan and Evermann described a species of the genus *Zacco* from Formosa, giving the name *Zacco evolans*. According to their statement it agrees fairly well with the Japanese species, *Zacco platypus*, except in the much greater length of the pectorals. All the characters, especially the length of the pectoral fin, of the above described specimen agree quite well with those of the type of *Zacco evolans* in the Stanford collections (No. 7129; Taihoku, Formosa). But, after a close examination of a vast number of specimens of the present species from the same locality, I found that the length of the pectoral fin is variable. Even the co-type of *Z. evolans* in the Stanford collections (No. 7333; Taihoku) is provided with shorter pectoral fins which scarcely reach to the root of the ventral.

Such being the case, it is inadvisable to specifically separate the Formosan form from the Japanese *Z. platypus*.

DESCRIPTION OF THE TYPE SPECIMEN OF *Zacco evolans*, JORDAN & EVERMANN.

(No. 7129; Stanford collection; Taihoku; Tada coll.)

Head 4.22 in length; depth 3.42; D. II, 7; A. 3, 9; P. 15; V. 9; width of head 2 in its length; eye 3.33 in head; interorbital space 3; snout 3; forty-four scales in the lateral line, eight scales in an oblique series between origin of the dorsal and lateral line, four scales between the latter and the middle of belly, two scales between lateral line and the root of the ventral; ventral 1.20 in head; pectoral considerably longer than the head.

Body elongate, compressed; dorsal profile convex; head moderate, its top very slightly arched; snout pointed anteriorly; mouth oblique, its angle extending to a vertical through the anterior border of orbit; jaws subequal; eyes moderate, superior; nostrils close together, in front

MEASUREMENTS OF *Zacco platypus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Interorbital.	Snout.	Eye.	Scales.	Pectoral.	Length, Mm.
Choso River.....	4	3.71	II, 7	3, 9	15	9	2.77	3	4	8-43-4	Beyond V.	120
Tamusui River... 4	4.66	II, 7	3, 9	15	9	3	3	3.33	9-44-4	Reaching V.	115	
Tamusui River... 3.86	4.61	II, 7	3, 9	15	9	3	3	3.33	8-44-4	Reaching V.	100	
Tamusui River... 4	5	II, 7	3, 9	16	9	3	3	3.33	8-43-4	Reaching V.	108	
Tamusui River... 4	4.25	II, 7	3, 9	15	9	3	3	3.40	8-42-4	Reaching V.	107	
Shinchiku.....	4	4.35	II, 7	3, 9	13	9	3	3	8-44-4	Not to V.	92	
Taihoku (Type <i>Z. evolans</i>) .	4.22	3.42	II, 7	3, 9	15	9	3	3	3.33	8-44-4	Beyond V.	98
Tsuchiura (S. No. 7340).....	4	3.80	II, 7	3, 9	15	9	3	3	4	8-44-4	Reaching V	135
Tsuchiura (S. No. 7340).....	4.30	3.64	II, 7	3, 9	15	9	3	3	4.50	8-44-4	Reaching V.	150
Tsuchiura (S. No. 7340).....	4.24	4.50	II, 7	3, 9	15	9	3	3	3.66	8-44-4	Not to V.	148
Lake Biwa (S. No. 22623)....	4	4.75	II, 7	3, 9	15	9	3	3	4	8-44-4	Not to V.	112
Lake Biwa (S. No. 22623)....	4.50	5	II, 7	3, 9	15	9	3	3	4	8-44-4	Not to V.	138
Lake Biwa (S. No. 22623)....	4	4.71	II, 7	3, 9	15	9	3.25	3.25	4	8-42-4	Not to V.	120

of eye; lower part of pre-operculum, sides of the snout, and outer part of the lower jaw with a number of round tubercles.

Origin of the dorsal nearer tip of snout than base of caudal, opposite

the ventral, the fin very high, rays longer than the head; pectoral fins elongate, reaching to the root of anal; anal fin very large, its rays nearly twice as long as head; caudal fin deeply bifurcate, the tip of each lobe pointed.

Scales thin and cycloid; lateral line decurved, low, extending along the lower half of the tail.

Color in alcohol brownish gray above, silvery; sides with about eleven dark cross-bars; membrane of dorsal and anal fins with a series of dark streaks; other fins pale.

Total length 98 mm.

37. *Zacco temmincki* (Schlegel).

Chopien (Formosa).

1846. *Leuciscus temminckii* SCHLEGEL, Fauna Japonica, Poiss., p. 210, Pl. CI, Fig. 4; Nagasaki.
1868. *Opsariichthys temminckii* GÜNTHER, Cat. Fish., VII, p. 295; Japan.—ISHIKAWA, Zoöl. Mag. Tokyo, 1895, p. 121; Hikone; Matsubara.
1901. *Barilius temminckii* JORDAN & SNYDER, Check-list, Fish. Japan, p. 47; Lake Biwa.
1903. *Zacco temminckii* JORDAN & FOWLER, Proc. U. S. Nat. Mus., XXVI, p. 852; Kawatana; Mogi River.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 404; Yamaguchi.—JORDAN & Metz, Mem. Carneg. Mus., VI, no. 2, 1913, p. 21; Fusan; Pung-tung, Corea.
1901. *Opsariichthys acanthogenys* BOULENGER, Proc. Zoöl. Soc. London, p. 269; Ningpo.
1903. *Zacco pachycephalus* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 322; Taihoku, Suwata, Formosa (not of Günther).

Head 4 in length; depth 4.5; D. II, 7; A. 3, 9; P. 15; V. 9; width of head 2 in its length; eye 4 in head; interorbital space 2.75; snout 3; ventral 1.5; pectoral as long as head; fifty scales in the lateral line, nine scales in an oblique series between origin of the dorsal and lateral line, six scales between the latter and the middle of belly, three scales between lateral line and the root of the ventral; pharyngeal teeth 4, 4, 1-1, 4, 5; gill-rakers 3 + 7.

Body elongate, compressed, deeper anteriorly, postventral edge rather sharp, but not carinated; head moderate, its top more or less convex; snout bluntly pointed anteriorly; mouth oblique, its angle reaching beyond the anterior border of orbit; upper jaw normal, lower jaw not protruding; eyes superior and anterior; nostrils close together, in front of eye; sides of snout, cheeks, and lower jaws with a number of tubercles.

Origin of dorsal at a point midway between tip of snout and base of caudal, slightly behind that of ventral, fin short and high, its ray not exceeding the length of head; pectoral elongate, scarcely reaching the root of ventral; ventral fins reaching the origin of anal; anal fin rather long, its middle rays considerably elongate, when depressed reaching beyond the root of caudal, furnished with horny tubercles; caudal fin forked, rather long; depth of caudal peduncle 2.5 in length of head.

Scales thin and cycloid; lateral line strongly decurved, extending along lower half of the tail.

Color in formalin dark gray above, paler below; belly and lower part of sides silvery; sides with ten black cross-bars and two irregular

MEASUREMENTS OF *Zacco temminkii*.

Locality.	Head.	Depth.	D.	A.	P.	A.	Ineorbital.	Snout.	Eye.	Teeth.	Scales.	Sc. Bet. Lat. Line & V.	Length, Mm.
Ako.....	4	4.50	II, 7	3, 9	15	9	2.75	3	4	4, 4, I— 1, 4, 5	9-50-6	3	96
Ako.....	3.80	3.80	II, 7	3, 9	14	9	3	3	3.75	4, 3, I— 1, 4, 5	10-49-6	3	92
Tamusui River...	3.30	4.25	II, 7	3, 9	16	9	3	3.18	4.50	4, 4, I— 1, 4, 4	11-53-6	2	125
Giran River.....	3.87	3.31	II, 7	3, 9	15	9	2.66	3	5	4, 4, I— 1, 4, 5	10-52-6	3	145
Heirinbi.....	3.33	3.88	II, 7	3, 9	15	9	3	3	4.50	.....	10-49-6	3	117
Inzanpo.....	4	3.71	II, 7	3, 9	15	9	3	3	4	.....	10-51-6	3	108
Inzanpo.....	3.60	4.	II, 7	3, 9	15	9	3	3	5	.....	10-49-6	3	130
Tensonpi.....	3.50	4.66	II, 7	3, 9	15	9	3.25	3.25	4.33	.....	10-49-6	3	110
Suwo.....	3.72	4.14	II, 7	3, 9	15	9	3	3	4.75	.....	10-49-6	3	110
Shimotamusui R. . .	4	4	II, 7	3, 9	15	9	3	3	3.5	4, 4, I— 1, 4, 5	10-49-6	3	86
Shimotamusui R . .	4	3.89	II, 7	3, 9	15	9	2.75	3.33	3.66	4, 4, I— 1, 4, 5	9-52-6	3	80
Sobun River.....	3.82	4	II, 7	3, 9	15	8	3	3	4	4, 4, I— 1, 4, 5	10-49-6	3	97
Rigyokutsu.....	3.75	3.75	II, 7	3, 9	15	9	3	3.25	4	4, 4, I— 1, 4, 5	10-49-6	3	100
Lakusui River . . .	3.33	4	II, 7	3, 9	15	9	3	3	4	4, 4, I— 1, 4, 4	10-51-6	3	100
Lakusui River . . .	3.31	4	II, 7	3, 9	15	9	3.25	3	4	.....	11-50-6	3	89
Taihoku (<i>Z. pachycephalus</i>)													
S. 12232 (7720) ..	3.60	4	II, 7	3, 9	15	9	3	3	4.50	.....	10-50-6	3	...
Suwata (<i>Z. pachycephalus</i>)													
S. 12076 (7720) ..	3.60	3.75	II, 7	3, 9	15	9	3.25	3	4	.....	10-48-6	3	...

dark spots on the tail; nape just behind the gill-opening dark; dorsal fin with a series of black streaks; dorsal, anal, and caudal fins dusky; other fins whitish.

Total length 96 mm.

Described from a specimen from Ako, collected by T. Aoki in December, 1916.

Habitat: One of the most abundant of the Formosan *Cyprinidae*. My specimens came from Tamusui River; Daiko River; Daito River; Shinchiku; Dakusui River; Rigyokutsu, Nanto; Sobun River; Shimotamusui River; Ako; Heirinbi; Inzanpo; Tensonpi; Suwo; Giran.

Remarks: Jordan and Evermann described a species of the genus *Zacco* from Suwata and Taihoku, Formosa, under the name *Zacco pachycephalus* (Günther) (Proc. U. S. Nat. Mus., XXV, 1903, p. 322). As shown in the following table, the two specimens which are contained in the Stanford collections have ten scales between origin of dorsal and lateral line, three scales between the latter and the root of ventral, and forty-eight to fifty scales in lateral line, instead of 12-55-4 as in the type of Günther's *Z. (Opsariichthys) pachycephalus*. Moreover, the other characters of these two specimens agree quite well with those of *Zacco temmincki*. It is reasonable, therefore, to transfer Jordan & Evermann's *Zacco pachycephalus* to the present species.

38. *Zacco pachycephalus* Günther.

1868. *Opsariichthys pachycephalus* GÜNTHER, Cat. Fish., VII, p. 297; Formosa.

Head 3.63 in length; depth 4; D. II, 8; A. 3, 9; P. 14; V. 9; width of head 2 in its length; eye 3.6 in head; interorbital space 3.14; snout 3; pectoral 1.22; ventral 1.66; fifty-three scales in the lateral line, twelve scales in an oblique series between origin of dorsal and lateral line, nine scales between the latter and the middle of belly, four scales between lateral line and the root of the ventral; pharyngeal teeth 5, 3, 1-1, 3, 4; gill-rakers 2 + 8.

Body oblong, compressed; head moderate, its top more or less flattened, cheek with traces of tubercles; snout pointed anteriorly, its dorsal profile curved; mouth oblique, its angle extending beyond the vertical through the anterior margin of the orbit; lower jaw very slightly shorter than the upper; eye superior; nostrils close together, supra-lateral, in front of the eye.

Origin of dorsal at a point midway between tip of snout and base of caudal, opposite to that of the ventral; pectoral fin not extending to

the root of ventral; ventral reaching vent; four anterior branched rays of the anal elongate, reaching beyond the root of caudal; caudal fin deeply emarginate, tip of each lobe pointed.

Scales minute, thin; lateral line decurved, extending along the lower half of the tail.

Color in formalin dark gray above, lower half of the sides and belly silvery; sides with about twelve indistinct dark cross-bars; a black longitudinal streak runs along the middle of the tail; membrane of the dorsal with a series of dark streaks; dorsal and caudal fins dusky, other fins whitish.

Total length 102 mm.

The present description is from a specimen from the Tamusui River near Shinten, collected by T. Aoki in December, 1916.

Habitat: Tamusui River (a single specimen).

Genus METZIA Jordan & Thompson.

1914. *Metzia* JORDAN & THOMPSON, Mem. Carneg. Mus., VI, no. 4, p. 227.
(Type *Acheilognathus mesembrinum* Jordan & Evermann.)

Body short, deep, very greatly compressed; head small and pointed; mouth moderate, somewhat oblique; the jaws subequal, maxillary reaching anterior edge of orbit; pharyngeal teeth in three rows, 4, 4, 2—2, 4, 4, with brown tip. Scales large and well imbricated; lateral line complete, decurved. Origin of the dorsal slightly nearer tip of snout than tip of caudal fin, anal inserted behind last dorsal ray; ventrals and pectorals moderate, the latter falcate; caudal fin lunate. Peritoneum black; intestine elongate. No barbel.

Distribution: Botel Tobago Island (Near Formosa).

39. *Metzia mesembrina* (Jordan & Evermann).

1903. *Acheilognathus mesembrinum* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 323; Kotosho, Formosa.

Head 4 in length; depth 3.18; D. 2, 7; A. 3, 14; P. 15; V. 8; width of head 2 in its length; eye 3.6 in head, interorbital space 2.57; snout 3.6; thirty-six scales in the lateral line, eight scales in an oblique series between origin of dorsal and lateral line, five scales between the latter and the middle of belly, three scales between lateral line and the root of the ventral; pharyngeal teeth 4, 4, 2—2, 4, 4.

Body deep, very greatly compressed; head small and pointed; snout short, truncated in front; mouth oblique, its angle reaching beyond the anterior border of orbit; the jaws subequal, with thin lips;

eyes large, anterior; nostrils superior, close together, in front of eye above; tip of the pharyngeal teeth brown.

Origin of the dorsal much nearer base of caudal than tip of snout, inserted opposite the interspace between the ventral and anal, the fin short and high, its anterior ray slightly shorter than the head; pectoral fin reaching the ventral; ventral inserted much in advance of the dorsal, not reaching the vent; the anal elongate, entirely behind the dorsal, its base oblique, free edge somewhat concave, anterior ray the longest; caudal fin emarginate, the tip of each lobe pointed; caudal peduncle rather short, its depth 2.33 in length of head.

Scales large, well imbricated; lateral line decurved, extending along the lower half of tail.

Color in alcohol grayish above; belly and lower part of sides silvery, with no markings; all the fins whitish.

Total length 84 mm.

Described from a specimen from Kotosho (Botel Tobago Island), collected by T. Tada. (Cotype; No. 7151, Stanford collections).

Habitat: Botel Tobago Island (Kotosho).

MEASUREMENTS OF *Metzia mesembrina*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Kotosho (Type; S. U. No. 7131)	4	2.8	8	15	—	—	—	2.50	4	3.50	8-38-5	83
Kotosho (Cotype; S. U. No. 7151)	3.89	3	2, 7	3, 13	15	8	2	2.85	3.80	3.40	7-36-5	90
Kotosho (Cotype; S. U. No. 7151)	4	3.18	2, 7	3, 14	15	8	2	2.57	3.60	3.60	8-36-5	84

Genus CANDIDIA Jordan & Richardson.

1909. *Candidia* JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, p. 169. (Type *Opsariichthys barbatus* Regan.)

Body covered with small scales. Lateral line slightly decurved, running along the lower part of the tail. Dorsal fin short, with seven branched rays, inserted opposite the root of ventrals, midway between tip of snout and base of caudal. Anal fin with nine branched rays. Barbels two, minute, maxillary. The angle of mouth extends beyond anterior margin of orbit. Gill-rakers very short, conical. Pharyngeal teeth 5, 4, 1-1, 4, 5.

Distribution: Formosa.

40. *Candidia barbata* (Regan).

Koeko or Gogahii (Formosa).

1908. *Opsariichthys barbatus* REGAN, Ann. Mag. Nat. Hist. (8), 11, p. 359; Lake Candidius, Formosa.

1909. *Candidia barbata* JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, p. 169; Lake Candidius (after Regan).

Head 3.6 in length; depth 3.66; D. 3, 7; A. 3, 9; P. 15; V. 9; width of head 2 in its length; snout 3 in head; interorbital space 2.7; eye 5; pectoral 1.5; ventral 1.75; fifty-six scales in the lateral line, three between the latter and the root of ventral, eight between lateral line and middle of belly; gill-rakers 3 + 8; pharyngeal teeth 5, 4, 1—1, 4, 5.

Body elongate, compressed, curvature of the dorsal profile equal to that of the ventral; head rather long, lower parts of operculum and suborbicular parts with a number of tubercles; snout truncated in front, partially covering the upper lip, its sides provided with conical tubercles, of which the anterior ones are larger; a notch in front of eye; mouth oblique, extending beyond the anterior border of orbit; upper lip thicker than the lower, the proximal half of which is provided with a series of large conical tubercles; upper jaw slightly protruding; two very short maxillary barbels; eyes anterior and superior; nostrils close together, superior, in front of eye.

Origin of dorsal midway between tip of snout and base of caudal, inserted above the origin of ventral, anterior rays longer; pectorals not reaching ventrals; anal entirely behind the dorsal, middle rays prolonged, each ray with traces of tubercles; caudal fin forked, each lobe sharply pointed; depth of caudal peduncle 2.33 in head.

Body covered with small scales; lateral line continuous, slightly decurved, extending along the lower part of the tail.

Color in formalin yellowish gray above, paler below, belly whitish; basal two-thirds of the membrane of the dorsal black; caudal fin grayish; the rest of the fin dusky white, with faint black mottlings; a black longitudinal band from the nape to the base of caudal.

Total length 120 mm.

Described from a specimen from Jitsugetsutan, collected by T. Aoki in August, 1916.

Habitat: Jitsugetsutan (Lake Candidius); Shito, Giran.

Remarks: The tubercles on the head and anal fin are very distinct in male specimens, while the anal of the female is nearly smooth. Lower parts of caudal peduncle of male sometimes tuberculated.

MEASUREMENTS OF *Candidia barbata*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Jitsugetsutan.	3.60	3.66	3, 7	3, 9	15	9	2	2.70	3	5	12-56-8	120
Jitsugetsutan.	3.48	3.73	3, 7	3, 9	15	9	1.77	2.71	2.71	5.33	11-57-8	159
Jitsugetsutan.	3.64	3.83	3, 7	3, 9	15	9	1.92	2.66	3	4.80	12-54-8	109
Jitsugetsutan.	3.66	3.66	3, 7	3, 9	14	9	2	2.70	2.89	5	11-54-8	117
Shito.	3.54	4	3, 7	3, 9	15	9	1.85	2.77	3	4.50	12-57-8	100

Genus *HYPOPHthalmichthys* Bleeker.

1860. *Hypophthalmichthys* BLEEKER, Prodr. Cypr., p. 405. (Type *Leuciscus molitrix* Cuv. & Val.)
1869. *Abramocephalus* STEINDACHNER, Wien, Sitzungsab., LX, p. 383. (Type *Abramocephalus microlepis* Steindachner.)
1872. *Onychodon* DYBOWSKY, Verh. Zool.-Bot. Ges. Wien, XXII, p. 211. (Type *Cephalus mantschuricus* Basilevsky.)

Body stout, compressed, back rounded, abdomen strongly compressed, with a sharp keel from throat to vent. Head rather small; mouth anterior, broader than deep, its angle not reaching the orbit; lips thin; barbel none. Eye situated in the lower half of the head, its lower margin being below the level of the angle of mouth. Gill-rakers continuous, forming a broad, crescentic, horny membrane, its basal portion perforated. Dorsal fin short, inserted behind the origin of ventral; anal fin triangular, entirely behind the dorsal. Gill-membranes united, forming a broad bridge across the isthmus. Scales small, about 115 in the lateral line. Pharyngeal teeth in one row, 4-4, compressed on the longitudinal axis of the bone. Lateral line decurved, running along the middle of the tail.

Distribution: China; Indo-China; Formosa; Amur Province.

41. *Hypophthalmichthys molitrix* (Cuv. & Val.).

Renhii (Formosa).

1844. *Leuciscus molitrix* CUV. & VAL., Hist. Nat. Poiss., XVII, p. 360.—RICHARDSON, Ichthyol. China, 1846, p. 259; Canton, China.
1844. *Leuciscus hypophthalmus* (GRAY) RICHARDSON, Ichthyol. Voy. Sulph., p. 139, Pl. 63, Fig. 1; Canton.
1855. *Cephalus mantschuricus* BASILEVSKY, Mem. Soc. Nat. Mosc., X, p. 235, T. VII, Fig. 3; Manchuria.
1860. *Hypophthalmichthys molitrix* BLEEKER, Ichth. Arch. Ind. Prods. II, Cyprin., p. 288.
1863. *Hypophthalmichthys molitrix* BLEEKER, Atlas Cyprin., III, p. 28.—GÜNTHER, Cat. Fish. VII, 1868, p. 298; China.—BLEEKER, Mem. Cyprin. China, 1871,

p. 83, Pl. XII, Fig. 1; Yang-tze-kiang.—GÜNTHER, Ann. Mag. Nat. Hist., Sept., 1889, p. 223; Ichang.—Ann. Mag. Nat. Hist. (7), 1, 1898, p. 362; Newchang.—BERG, Ichthyol. Amur., 1909, p. 154; Amur Provinces.

1872. *Onychodon mantshuricus* DYBOWSKI, Verh. Zoöl.-Bot. Ges. Wien, XXII, p. 211; Ussuri.

1878. *Hypophthalmichthys dabryi* BLEEKER, Versl. en Mededel. Konin. Akad. Wetensch. Amst. (2), XII, p. 210.

Head 3.58 in length; depth 3.25; D. 3, 7; A. 3, 12; P. I, 17; V. 8; width of head 1.48 in its length; eye 6 in head; interorbital space 2; snout 3.16; pectoral 1.30; ventral 1.48; one and fifteen scales in the lateral line, twenty-eight scales in an oblique series between origin of the dorsal and lateral line, twenty-one scales between the latter and the middle of belly, fifteen scales between lateral line and the root of ventral; pharyngeal teeth 4-4.

Body stout, compressed, back rounded, abdomen strongly compressed, with a sharp keel from throat to vent; head moderate, smooth, postoperculum with radiated striæ; snout blunt, obtusely rounded anteriorly; mouth anterior, broader than deep, its angle not extending to the orbit; lips rather thin; lower jaw slightly longer than the upper; eyes rather small, anterior and inferior; nostrils close together, superior; pharyngeal teeth stout, high, laterally compressed, inner surface with a large oval concavity of brown color; gill-membranes strongly extending beyond the gill-covers united across the isthmus; gill-rakers continuous, forming a broad, crescentic, horny membrane, its basal portion perforated.

Origin of dorsal midway between tip of snout and base of caudal, very short, anterior ray the longest, when depressed its tip reaching beyond all other rays; pectoral fin armed with a smooth spine, reaching the root of ventral; origin of ventral much in advance of that of dorsal, rather slender, not reaching the vent; anal fin triangular, entirely behind the dorsal, its origin nearer to that of ventral than base of caudal; caudal fin deeply emarginate, tip of each lobe sharply pointed; caudal peduncle elongate, its depth 1.5 in the length of head.

Scales minute, cycloid; lateral line decurved, continuous, extending along the middle of tail.

Color in formalin grayish above, sides and belly silvery; dorsal and caudal fins pale gray; upper surface of the pectoral speckled with fine black spots, lower surface whitish; other fins whitish.

Total length 370 mm.

Described from a specimen from Shori, Toyen.

Habitat: Bred in ponds throughout the island.

Remarks: The present species is one of the important food-fishes, though it is not a native of the island. In the spring, young of *H. molitrix* are imported from Southern China and are bred artificially like other Chinese fishes.

MEASUREMENTS OF *Hypophthalmichthys molitrix*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Min.
Shori	3.58	3.25	3, 7	3, 11	1, 17	8	1.41	2	3.16	6	28-115-21	370
Giran	3.14	3.33	3, 7	3, 11	1, 17	8	1.75	2.20	3	6	28-119-21	330

ARISTICHTHYS gen. nov.

Type *Leuciscus nobilis* (Gray) Richardson.

Body stout, compressed, rather high in front; abdomen rounded, with a keel only in the postventral part. Head large; snout rather short, obtusely rounded. Mouth oblique, anterior, its angle reaching below the center of eye; lips thin; barbel none. Eye inferior and much anterior. Gill-rakers separated, slender and long, set very closely, with many membranous septa. Dorsal fin short, inserted behind the origin of ventral; anal fin triangular, entirely behind the dorsal. Gill-membranes united, forming a broad bridge across the isthmus. Scales small, about 115 in the lateral line. Pharyngeal teeth in one series, 4-4, strongly compressed laterally. Lateral line strongly decurved anteriorly, running along the middle of the tail.

Distribution: Formosa; South China.

Remarks: The present genus is a near relative of *Hypophthalmichthys*. It differs distinctly from the latter in having clearly separated gill-rakers, large head, and rounded abdomen, which has no keel in front of the ventral.

42. *Aristichthys nobilis* (Richardson).

Chikuyoren (Formosa).

1844. *Leuciscus nobilis* (GRAY) RICHARDSON, Ichthyol. Voy. Sulph., p. 140, Pl. 63, Fig. 3; Canton, China.
1866. *Cephalus hypophthalmus* STEINDACHNER, Verh. Zool.-Bot. Gesell. Wien, p. 383; Hongkong.
1867. *Hypophthalmichthys manchuricus* KNER, Novara Fisch., III, p. 350; Shanghai.
1868. *Hypophthalmichthys nobilis* GÜNTHER, Cat. Fish., VII, p. 299; Amoy.—

BLEEKER, Mem. Cyprin, Chine, 1871, p. 85; Yang-tze-kiang.—GÜNTHER, Ann. Mag. Nat. Hist., Sept., 1873, p. 249; China.—PETERS, Monatsb. Ak. Berlin, 1880, p. 926.—SAUVAGE, Bull. Soc. Philom., 1881, p. 7; Swatow.—GÜNTHER, Ann. Mag. Nat. Hist. (6), IV, 1889, p. 228; Yang-tze-kiang.—RUTTER, Proc. Acad. Nat. Sc. Philad., 1897, p. 60; Swatow.

Head 2.8 in length; depth 3.28; D. 3, 7; A. 3, 11; P. I, 19; V. I, 7; width of head 1.76 in its length; eye 7.75 in head; interorbital space 2.11; snout 2.5; pectoral 1.28; ventral 1.83; one hundred and fifteen scales in the lateral line, twenty-five scales in an oblique series between origin of dorsal and lateral line, twenty-five scales between the latter and the middle of belly, seventeen scales between lateral line and root of ventral; pharyngeal teeth 4-4.

Body compressed, rather high in front; abdomen rounded, post-ventral part with a keel; head large, postoperculum with radiated striæ; snout rather short, broad, obtusely rounded anteriorly; mouth oblique, anterior, its angle reaching below the center of eye; lower jaw more or less protruding; middle part of the upper lip thick; eye inferior, much anterior; nostrils close together, superior, in front of eye above; gill-openings very large, with broad gill-membranes which are united on the throat and not attached to isthmus; pharyngeal teeth very high, strongly compressed laterally, inner surface with a large oval concavity; gill-rakers slender and long, set very closely, with many membranous septa.

Origin of dorsal nearer to base of caudal than tip of snout, rather short, anterior ray the longest, the depressed tip of the ray reaching beyond the others; pectoral large, reaching beyond the root of ventral, armed with a smooth osseous ray; ventral slender, the tip reaching vent, its origin in advance of that of the dorsal; anal fin entirely behind the dorsal, triangular, external margin more or less concave, inserted nearer origin of ventral than base of caudal; caudal fin deeply emarginate, tip of each lobe pointed; caudal peduncle elongate, its depth 3 in the length of head.

Body covered with small cycloid scales; lateral line strongly decurved in front; extending along the middle of the tail.

Color in formalin grayish above, paler below; sides and lower parts silvery; dorsal, anal, and caudal fins grayish, speckled with minute black spots; lower surface of pectorals and ventrals white, upper surface grayish and finely spotted with black.

Total length 455 mm.

Described from a specimen from Shori, Toyen.

Habitat: The present species is not a native of Formosa. Propagated artificially throughout the island.

Remarks: *Aristichthys nobilis* is a native of Southern China. Its young which are collected in the rivers near Swatow, Amoy, or Foo-chow are imported to Formosa and are bred in ponds, mingling with *Hypophthalmichthys molitrix*. Sometimes it reaches an enormous size, though it never spawns in Formosa.

Genus CHANODICHTHYS Bleeker.

1860. *Chanodichthys* BLEEKER, Nat. Tijdschr. Ned. Ind., XX, p. 432. (Type *Leptocephalus mongolicus* Basilewsky.)

1865. *Parabramis* BLEEKER, Nedrl. Tijdschr. Dierkunde, II, p. 21. (Type *Abramis pekinensis* Basilewsky.)

Body oblong, very greatly compressed; scales large. Snout convex; profile of the nape convex; mouth small, lower jaw not protruding, upper jaw more or less overlapping the former. Eye very large. Gill-openings not extending as far as the orbit below. Lateral line slightly curved. Dorsal fin short, inserted somewhat nearer to tip of snout than base of caudal, armed with two smooth, strong spines. The anal elongate, with numerous rays. Pharyngeal teeth 4, 4, 2—2, 4, 4.

Distribution: Formosa; China; Amur Province.

43. *Chanodichthys macrops* Günther.

Toabakon (Formosa).

1868. *Chanodichthys macrops* GÜNTHER, Cat. Fish., VII, p. 326; Formosa.

Head 4.31 in length; depth 3.375; D. II, 7; A. 3, 23; P. 16; V. 9; width of head 1.81 in its length; eye 3 in head; interorbital space 3.25; snout 3; pectoral 1.14; ventral 1.28; sixty scales in the lateral line, eleven scales in an oblique series between origin of dorsal and lateral line, eight scales between the latter and the middle of belly, five scales between lateral line and the root of ventral; pharyngeal teeth 4, 4, 2—2, 4, 4; gill-rakers 3 + 9.

Body strongly compressed, rather deep, postventral part carinate, dorsal profile abruptly arched behind the occiput; head rather small; snout obtusely pointed, as long as the diameter of eye; mouth subinferior and oblique, its angle reaching beneath the hind margin of nostril; lips thin; lower jaw shorter than the upper; eye very large, anterior and lateral; nostrils close together, large, in front of eye.

Origin of dorsal nearer tip of snout than base of caudal, armed with two smooth spines, of which the second is very strong, anterior ray longest; pectoral fin long, with a fleshy flap, almost reaching the root of ventral; ventral fin inserted in advance of that of dorsal, with a scaly flap; anal fin elongate, rays numerous, entirely behind the dorsal, posterior rays very low; caudal fin strongly emarginate, tip of each lobe sharply pointed; caudal peduncle rather short, its depth 2.25 in length of head.

Scales moderate, cycloid; lateral line more or less decurved, extending along lower half of the tail.

Color in formalin dark gray above, lower half of sides and belly silvery; all the fins except ventrals dusky.

Total length 207 mm.

Described from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1916.

Habitat: Tamusui River (Shinten and Heirinbi).

Remarks: The present species is very closely allied with *Chanodichthys stenzi* from Kiautschau, China, differing from it in having a smaller number of anal rays.

MEASUREMENTS OF *Chanodichthys macrops*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Shinten.....	4.31	3.37	II, 7	3, 23	16	9	1.81	3.25	3	3	11-60-8	207
Shinten.....	4.10	3.40	II, 7	3, 22	16	9	2	3.45	3	3	11-58-8	185
Heirinbi.....	4.16	3.42	II, 7	3, 23	15	9	2.09	3	3	2.75	10-61-8	122

Genus *CULTER* Basilewsky.

1855. *Culter* BASILEWSKY, Nouv. Mem. Soc. Nat. Moscou, X, p. 236. (Type *Culter alburnus* Basilewsky as restricted by Günther.)

Body oblong, much compressed, the entire or postventral abdominal edge being trenchant. Scales of moderate or small size; lateral line without conspicuous curvature. Mouth directed upwards; barbels none. Dorsal fin short, with strong smooth spines, inserted above the interspace between ventral and anal; anal fin long, many-rayed; caudal fin forked, pectorals elongate. Gill-openings very wide; gill-rakers long, setiform. Pseudo-branchiæ present. Pharyngeal teeth in a triple series, slender and hooked. Intestinal tract short. Air-bladder tripartite. (Günther).

Distribution: China; Formosa; Corea; Amur Province.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a. Postventral edge only carinate; scales about 85 in the lateral line; 18 scales between lateral line and the origin of dorsal; 10 scales between lateral line and the root of ventrals. *aokii*.
- aa. Abdomen entirely carinate; scales about 64 in the lateral line; 11-12 scales between lateral line and the origin of dorsal; 6 scales between lateral line and the root of ventrals. *brevicauda*.

44. *Culter aokii* sp. nov. (Plate LII, Fig. 1).

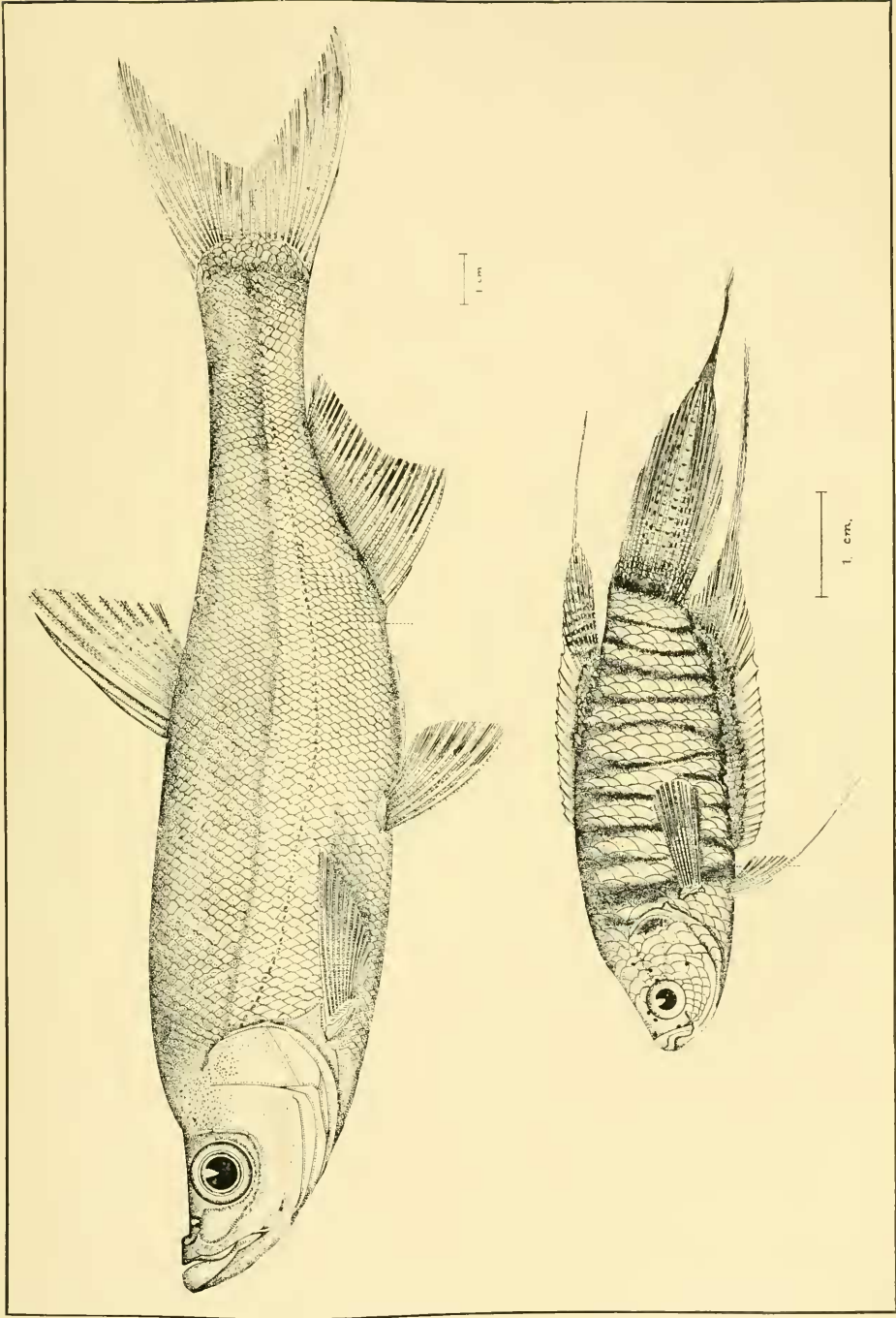
Kyauyo (Formosa).

Head 4.05 in length; depth 4.6; D. III, 7; A. III, 23; P. 15; V. 9; width of head 2.6 in its length; eye 4 in head; interorbital space 6; snout 3.75; eighty-six scales in the lateral line, eighteen scales in an oblique series between origin of dorsal and lateral line, ten scales between the latter and the middle of belly, six scales between lateral line and the root of ventral; pharyngeal teeth 5, 4, 2-2, 4, 5; gill-rakers 5 + 22.

Body oblong, much compressed, postventral abdominal edge carinate, dorsal profile convex; head rather long, laterally compressed, the top osseous, with two bony ridges between the eyes; interorbital space very narrow, slightly convex; many mucous cavities below and behind the orbit; snout bony, tip swollen, a slight depression in front of eye above, tip of its skin not overlapping the upper lip; mouth anterior, subvertical, its angle not reaching the vertical through anterior margin of orbit; lips thin; lower jaw more or less protruding; mentum provided with two strong osseous ridges which are united in front, extending backward to the operculum; isthmus entirely hidden beneath those ridges; eyes large, anterior; nostrils close together, more or less superior; gill-openings very large, gill-membranes entirely separated; gill-rakers slender and long.

Origin of dorsal in a point midway between tip of snout and base of caudal, with three smooth spines, the first spine very short, hidden beneath the skin, second shorter than half the length of the third, anterior ray the longest; pectoral armed with an osseous spiny ray, reaching the base of ventral; origin of ventral in advance of that of dorsal; anal fin entirely behind the dorsal, elongate, length of its base 1.17 in head; caudal fin emarginate, the tip of each lobe sharply pointed; caudal peduncle elongate, its depth 3 in length of head.

Body covered with thin cycloid scales; lateral line continuous, very slightly decurved, extending along near the middle of tail.



Culter aokii Oshima, sp. nov.

Macropodus filamentosus Oshima, sp. nov.

Color in alcohol pale gray above, belly and lower parts of the sides silvery; caudal fin grayish, other fins dusky white.

Total length 280 mm.

Described from a specimen from Jitsugetsutan, collected by T. Aoki in August, 1916.

Habitat: Restricted to Jitsugetsutan (Lake Candidius).

Remarks: This species is most nearly allied to *Culter sieboldi* Dybowski⁸ from Amur Province. The differences are as follows: a lesser number of scales in the lateral line, a lesser number of scales between lateral line and the middle of belly, as well as small size of the body. The above described species is one of the largest forms which is found in Lake Candidius.

Named for Mr. Takeo Aoki of the Bureau of Fisheries, Government of Formosa.

MEASUREMENTS OF *Culter aokii*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Jitsugetsutan..	4.06	4.60	III, 7	III, 23	I, 15	9	2.60	6	3.75	4	18-86-10	280
Jitsugetsutan..	3.88	4.33	III, 7	III, 22	I, 14	9	2.60	5.89	3.71	3.85	18-85-10	254

45. *Culter brevicauda* Günther.

1868. *Culter brevicauda* GÜNTHER, Cat. Fish., VII, p. 329; Formosa.—BLEEKER Mem. Cyprin. Chine, 1871, p. 69, Tab. XI, fig. 3; Yang-tze-kiang.—GÜNTHER, Ann. Mag. Nat. Hist., Sept., 1873, p. 250; Shanghai.

Head 4.38 in length; depth 3.79; D. II, 7; A. 3, 27; P. 16; V. 9; width of head 2.5 in its length; eye 4 in head; interorbital space 4; sixty-four scales in the lateral line, eleven scales in an oblique series between origin of dorsal and lateral line, eight scales between the latter and the middle of belly, six scales between lateral line and the root of the ventral; pharyngeal teeth 4, 4, 2-2, 4, 4; gill-rakers 6 + 23.

Body much compressed, abdominal edge entirely carinate, dorsal profile broadly convex, top of the head more or less fallen from the back, ventral profile undulating at the base of the ventral; head rather small, narrow, pointed, its top more or less convex; snout as long as the diameter of eye, truncated in front; mouth anterior and

⁸ *Culter sieboldi* Dybowski, Verh. Zoöl.-Bot. Gesell. Wien, XXII, 214; Middle Amur; Ussuri; Sungari; Chanka.

oblique, its angle reaching the nostril below; upper lip thin; lower jaw slightly protruding; eyes moderate, anterior; nostrils close together, in front of the eye above.

Origin of dorsal nearer base of caudal than tip of snout, opposite the interspace between ventral and anal, armed with two smooth spiny rays, the second spine is very strong; pectoral elongate, reaching beyond the base of ventral; ventrals rather slender, inserted much in advance of that of dorsal; anal fin very long, anterior ray the longest; caudal fin strongly forked, the tip of each lobe sharply pointed; caudal peduncle rather short, its depth 2.33 in the length of head.

Body covered with moderate cycloid scales; lateral line slightly decurved, extending along the lower half of the tail.

Color in alcohol grayish above, belly and lower half of the sides silvery; fins dusky white.

Described from a specimen from Kagi, collected by Y. Kikuchi.

Habitat: Kagi (a single specimen).

Remarks: This species is closely related to *Culter recurviceps* (Richardson)⁹ from which it differs in having an entirely carinate abdominal edge and a lesser number of scales in the lateral line.

CULTRICULUS gen. nov.

Type *Culter leucisculus* Kner (not of Basilewsky) = *Hemiculter kneri* Kreyenberg.

Body oblong, much compressed, abdominal edge entirely carinate. Scales of moderate size; lateral line continuous, abruptly bending downward above the pectoral, scarcely reaching the tip of the fin, thence advancing backward, ascending gradually, and running along the middle of the sides of the tail. Mouth oblique; jaws subequal; barbels none. Dorsal fin short, with no smooth spines, inserted behind the origin of ventral; pectoral moderate, not reaching the ventral; anal fin rather short, with fifteen to seventeen rays. Gill-rakers slender and long. Pharyngeal teeth 5, 4, 2—2, 4, 5.

Distribution: Formosa; China; Indo-China.

Remarks: Bleeker's *Hemiculter* is the genus most closely related to *Cultricusulus*. It differs from the present genus in having the abdomen non-carinate or only partially carinate (postventral part only).

⁹ *Leuciscus recurviceps* Richardson, Ichthyol. China, 1845, p. 259; Canton, China. *Culter recurviceps* Günther, Cat. Fish., VII, 1868, p. 328, China.

46. *Cultricus kneri* (Kreyenberg).

Unahii or Kirara (Formosa).

1867. *Culter leucisculus* KNER, Novara Fisch., III, p. 362; Shanghai.
 1868. *Chanodichthys leucisculus* GÜNTHER, Cat. Fish., VII, p. 327; Shanghai (after Kner.)
 1873. *Hemiculter leucisculus* GÜNTHER, Ann. Mag. Nat. Hist. Sept., p. 249; Shanghai.—Ann. Mag. Nat. Hist., 1888, p. 433; Yang-tze-kiang.—BERG, Ichthyol. Amur., 1909, p. 146.
 1908. *Hemiculter kneri* KREYENBERG, Berlin Sitzb. Ges. Natf. Freunde, p. 105 (nom. nov. for *Culter leucisculus* Kner).

Head 4.56 in length; depth 4.56; D. 11, 7; A. 2, 11; P. 15; V. 9; width of head 2.17 in its length; eye 4 in head; interorbital space 3.5; snout 3.25; pectoral 1.11; ventral 1.5; fifty-two scales in the lateral line, eight scales in an oblique series between origin of dorsal and lateral line, 3.5 scales between the latter and the middle of belly, 2 scales between lateral line and the root of the ventral; pharyngeal teeth 5, 4, 2—2, 4, 5; gill-rakers 4 + 17.

Body elongate, much compressed; entire abdominal edge carinate; head moderate, narrow; snout pointed anteriorly, its tip slightly swollen; mouth anterior and oblique, its angle scarcely reaching the anterior margin of the nostril below; lower jaw slightly shorter than the upper, with rather sharp edge; eyes moderate, anterior and superior; nostrils close together, in front of eye above.

Origin of dorsal about midway between tip of snout and base of caudal, inserted behind that of the ventral, with two smooth spines, of which the second is stronger, anterior ray the longest; pectoral fin moderate, not reaching the ventral; ventrals slender, inserted in front of the origin of dorsal; anal entirely behind the dorsal, rather short, triangular, anterior ray the longest; caudal fin bifurcate, tip of each lobe sharply pointed; caudal peduncle elongate, its depth 2.66 in length of head.

Body covered with thin cycloid scales; lateral line continuous, abruptly bending downward above the pectoral; thence passing backward, making a weak curve, extending along the middle of the sides of the tail.

Color in formalin olive-gray above, lower half of the body white; dorsal and caudal fins grayish, other fins white.

Total length 182 mm.

Described from a specimen from Jitsugetsutan, collected by T. Aoki in August, 1916.

Habitat: Jitsugetsutan (Lake Candidius); Shimotamusui River.

Remarks: According to the description by Kner the type of the present species has 4, 3, 2—2, 3, 4 pharyngeal teeth instead of 5, 4, 2—2, 4, 5.

The Chinese people who live near Lake Candidius use two vernacular names for the present species, namely, "Unahii" and "Kirara." They treat these two as different fishes. But there is no doubt that "Kirara" is the young form of "Unahii," for no morphological differences exist between them.

DESCRIPTION OF "KIRARA."

Head 4.5 in length; depth 5; D. II, 7; A. 2, II; P. 15; V. 9; width of head 2.33 in its length; eye 3 in head; interorbital space 3.5; snout 3.5; ventral 1.5; pectoral as long as the head; fifty-two scales in the lateral line, eight scales between origin of dorsal and lateral line, four scales between the latter and the middle of belly, two and one-half scales between lateral line and the root of the ventral; pharyngeal teeth 5, 4, 2—2, 4, 5; gill-rakers 5 + 16.

Body slender, elongate, compressed, entire abdominal edge carinate; head moderate, narrow, its top very slightly convex; snout pointed anteriorly, upper surface flat, tip swollen; mouth anterior and oblique, its angle scarcely reaching a vertical through anterior margin of nostril; lower jaw slightly shorter than the upper, with rather sharp anterior edge; eyes large, anterior; nostrils close together, supralateral, the anterior nostril in a short tube.

Origin of the dorsal midway between tip of snout and base of caudal, inserted behind the origin of the ventral, with two smooth spines; height of the fin equal to the length of head; pectoral elongate, scarcely reaching the root of ventral; ventral fin small, inserted in advance of the dorsal; anal fin entirely behind dorsal, triangular, anterior ray the longest; caudal fin slender, elongate, deeply emarginate, tip of each lobe sharply pointed; caudal peduncle elongate, strongly compressed laterally, its depth 2.75 in the length of head.

Body covered with thin cycloid scales; lateral line continuous, abruptly bending downward from the nape to the tip of the pectoral, thence passing backward and ascending gradually, running along the middle of the sides of tail.

Color in formalin pale olive-gray, lower parts whitish; top of head brown; a dark brown longitudinal band runs from nape to the base

of the caudal; median dorsal line with a pale brown band; all the fins whitish.

Length of body 64 mm.

Described from a specimen from Jitsugetsutan, collected by T. Aoki in August, 1916.

MEASUREMENTS OF *Cultricus kneri*

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Jitsugetsutan	4.56	4.56	II, 7	2, 11	15	9	2.17	3.50	3.25	4	8-52-3 $\frac{1}{2}$	182
Jitsugetsutan	4.34	4.86	II, 7	2, 12	14	8	2.20	3.30	3.56	3.56	8-51-4	170
Jitsugetsutan	4.45	4.90	II, 7	2, 13	15	8	2.44	3.66	3.66	3.66	8-52-4	117
Jitsugetsutan	4.50	5	II, 7	3, 11	15	9	2.33	3.50	3.50	3	8-52-4	64
Shimotamusui River	4.50	4.50	II, 7	2, 12	14	8	2.33	3.38	3.71	3.71	8-50-4	145
Shimotamusui River	4.35	5	II, 7	2, 12	15	8	2.66	3.60	3.60	3.60	8-49-3	90

DOUBTFUL SPECIES.

In the year 1903, Jordan and Evermann mentioned two species of cyprinoid fishes from Formosa under the name *Cirrhina* sp. and *Dillonia* sp. (*Proc. U. S. Nat. Mus.*, XXV, p. 322 and 324). For the sake of completeness I give the original descriptions by those authors. I have no specimens which belong to the general *Cirrhina* and *Dillonia*; therefore nothing more can be said of them at present.

Cirrhina sp. Jordan & Evermann.

"Closely allied to *Cirrhina chinensis* Günther. D. 15; A. 7; scales 37; teeth 5, 4, 2. (No. 837, Formosa; Imperial Fisheries Institute, Japan.)"

Dillonia sp. Jordan & Evermann.

"Allied to *Dillonia aculeata* Cuvier and Valenciennes. Head shaped as *Scaphiodon*. Mandibles with barbels; D. 10; A. 11; scales 39."

Family PÆCILIIDÆ.

Genus ORYZIAS Jordan & Snyder.

1906. *Oryzias* JORDAN & SNYDER, *Proc. U. S. Nat. Mus.*, XXXI, p. 289. (Type *Pæcilia latipes* Temminck & Schlegel.)

Body elliptical in form, compressed, covered with large scales; mouth small, with two rows of small, simple, pointed teeth; no teeth on vomer; gill-opening not restricted above; intestinal canal short, about as long as body; peritoneum black. Dorsal fin short, inserted above middle of anal; anal very long, having from seventeen to twenty

rays; caudal fin truncate. Sexes similar, except in color; anal fin not modified in the male. (Jordan & Snyder.)

Distribution: Japan; Corea; Formosa.

47. *Oryzias latipes* (Temminck & Schlegel).

Medaka (Japan); Tamhii (Formosa).

1846. *Pecilia latipes* TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., p. 224. Pl. CII, Fig. 5; Nagasaki.
1866. *Haplocheilus latipes* GÜNTHER, Cat. Fish., VI, p. 311. Nagasaki.
1901. *Aplocheilus latipes* JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, p. 350.
1906. *Oryzias latipes* JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXXI, p. 289; Japan.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 407; Shiogama; Yamaguchi; Akune; Nanao; Dogo Island.—JORDAN & METZ, Mem. Carneg. Mus., VI, no. 2, 1913, p. 24; Fusan; Suigen, Corea.—JORDAN, Snyder, & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 91; Japan.

Head 4 in length; depth 4.5; depth of caudal peduncle 9.5; eye 2.5 in head; interorbital space 2; snout 4; D. 6; A. 18; P. 9; V. 5; thirty-one scales in a lateral series; five branchiostegals.

Posterior half of the body compressed, becoming broader anteriorly, highest in front of the anal; head flattened; interorbital space broad; snout shorter than the diameter of eye, broadly rounded anteriorly; mouth anterior, transverse; lower jaw slightly projecting, each jaw with two rows of minute pointed teeth, those on the posterior row smaller; vomer smooth; thirteen short, pointed gill-rakers on the first arch; eyes very large, anterior and superior.

Dorsal fin short, on the posterior half of body, its origin above the posterior two-thirds of anal, its height equal to the distance between tip of snout and posterior margin of orbit; pectoral inserted on the median line of body, its length contained 5.5 in the length of body; the ventral small, reaching vent; base of the anal very long, its posterior end opposite to that of the dorsal, anterior ray longest; tip of the caudal fin rounded.

Top and sides of head, throat, and chin naked; body covered with thin cycloid scales; lateral line absent.

Color in formalin pale gray above, lower parts silvery; a black longitudinal streak from the nape to the origin of the dorsal; sides of body with a faint dusky stripe along the middle line, top of head dark; the edges of scales dusky; fin-rays of the ventral and anal dotted with minute black spots; all the fins whitish; peritoneum black.

Length of body 28 mm.

The present description is from a specimen from Shori, collected by T. Aoki in February, 1917.

Habitat: The present species is very common in rice-fields and pools on the island. My specimens came from Shori; Ako; and Giran (Kizanto and Taiko).

MEASUREMENTS OF *Oryzias latipes*.

Locality.	Head.	Depth.	Caudal Peduncle.	D.	A.	P.	V.	Inter-orbital.	Snout.	Eye.	Scales.	Length, Mm.
Shori.....	4	4.50	9.50	6	18	9	5	2	4	2.50	31	28
Kizanto.....	3.33	4	9.50	6	18	9	5	2.33	3.33	2.33	31	32
Kizanto.....	4	4	9	6	18	9	5	2.33	3	2.33	31	40
Kizanto.....	3.66	4.33	9	6	18	9	5	2.50	3	2.33	31	27
Kizanto.....	3.88	4.40	8.66	6	17	9	5	2.33	3	2.33	30	35
Taiko.....	3.50	4.50	9	6	17	8	5	2	3	2.50	30	21
Taiko.....	3.50	4	8.66	6	17	9	5	2	3	2.33	29	20

Genus GAMBUSIA Poey.

1855. *Gambusia* POEY, Mem. Cub., I, p. 382. (Type *Gambusia punctata* Poey.)

Body moderately elongate, becoming deep in the adult female. Mouth moderate, the lower jaw projecting, the bones well joined; both jaws with a band of pointed teeth which are not movable; snout not produced. Eyes normal, not divided. Scales large. Gill-openings not restricted. Dorsal and anal fins both rather short and small, the anal more or less in advance of the dorsal; anal fin of the male much advanced and modified into a long intromittent organ, which is about as long as head. Intestinal canal short. Six branchiostegals. Vertebrae about thirty-two. (Jordan & Evermann.)

Distribution: Mexico; Cuba; Southern States of North America.

48. *Gambusia affinis* (Baird & Girard).

Top-minnow.

1853. *Heterandria affinis* BAIRD & GIRARD, Proc. Ac. Nat. Sci. Philad., p. 390; Texas.

1859. *Gambusia speciosa* GIRARD, Proc. Ac. Nat. Sci. Philad., p. 121; Rio San Diego, New Ulm, Mexico.

1859. *Gambusia gracilis* GIRARD, Proc. Ac. Nat. Sci. Philad., p. 121; Mexico.

1866. *Gambusia humilis* GÜNTHER, Cat. Fish., VI, p. 334.

1866. *Gambusia affinis* GÜNTHER, Cat. Fish., VI, p. 336; Texas.—EVERMANN & KENDALL, Bull. U. S. Fish. Comm., XII, 1892, p. 107, Pl. 25; Fig. 2.—JORDAN & EVERMANN, Bull. U. S. Nat. Mus., 47, 1896, p. 680 (in part).

Head 3.8 in length; depth 4.33; D. 7; A. 10; P. 12; V. 6; eye 3 in head; interorbital space 2; snout 2.66; pectoral 1.33; ventral 2.5; thirty-one scales in a lateral series.

Posterior part of body compressed, anterior half high and broad, curvature of the dorsal profile stronger than that of the ventral; head moderate, broad, depressed; snout short, obtusely rounded anteriorly, upper surface flattened; mouth anterior, transverse; lower jaw longer than the upper; jaws with a broad band of villiform teeth, palatine with a narrow transverse band of villiform teeth; eye moderate, superior and slightly anterior; five branchiostegals; thirteen gill-rakers on the first arch; gill-openings large.

Origin of the dorsal slightly in advance of the end of the base of anal, distance to the base of the caudal about half of that to tip of snout, first ray shortest; pectorals inserted just below the middle of sides, their tips reaching beyond the origin of the ventral; ventral fins rather slender; the anal higher than the dorsal, anterior rays shorter, middle rays prolonged; caudal fin broad, tip obtusely rounded; caudal peduncle rather deep, its depth twice in the length of head.

Body covered with large scales; snout and cheek smooth; no lateral line.

Color in formalin dusky above; sides and belly whitish; the edges of scales dusky; top of head dark; a dark longitudinal stripe from occiput to the origin of the dorsal; a very narrow dark band along the middle of the sides; no dark marking below the eye; dorsal fin-rays speckled with black; all the fins whitish.

Length of body 44 mm.

Described from a specimen from the Government Hatchery at Shori. (Female).

Habitat: The present species is not a native of the island. About five years ago it was imported from Hawaii in order to exterminate anopheline mosquitoes and has been propagated artificially. It was introduced from Galveston, Texas, into Hawaii, and later into the Philippines by Mr. Alvin Seale, for the purpose of destroying mosquitoes.

Remarks: The male fish is very small; the anal modified into a sword-like intromittent organ. Measurements of a male specimen are as follows: Head 3.66 in length; depth 4.5; D. 7; A. 8 (third ray prolonged); P. 12; V. 6; snout 3 in head; interorbital space 2; eye 2.5; total length 24 mm.

MEASUREMENTS OF *Gambusia affinis*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Interorbital.	Snout.	Eye.	Scales.	Length. Min.
Shori (♀).....	3.80	4.33	7	10	12	6	2	2.66	3	31	44
Shori (♀).....	3.50	4	7	10	12	6	2	2.50	3	30	41
Shori (♀).....	3.66	4.13	7	10	12	6	1.8	3	3.33	30	40
Shori (♀).....	3.33	4.14	7	9	12	6	2	2.66	3.33	31	37
Shori (♂).....	3.66	4.50	7	8	12	6	2	3	2.50	30	24
Shori (♂).....	3.17	4.25	7	8	12	6	3	4	4	30	23
Shori (♂).....	3.50	4.40	7	8	12	6	2	3	3	30	22

Family MONOPTERIDÆ.

Genus FLUTA Bloch & Schneider.

- 1798. *Monopterus* LACÉPÈDE, Hist. Nat. Poiss., II, p. 139. (Type *Monopterus javanensis* Lacépède). Not *Monopterus* of Volta, 1796, a genus of fossil fishes.
- 1801. *Fluta* BLOCH & SCHNEIDER, Ichth., p. 565. (Type *Monopterus javanensis* Lacépède.)
- 1845. *Ophicardia* McCLELLAND, Calcutta Journ. Nat. Hist., V, p. 191. (Type *Ophicardia pharyriana* McClelland.)
- 1855. *Apterigia* BASILEWSKY, Nouv. Mém. Soc. Nat. Mosc., X, p. 247. (Type *Apterigia saccogularis* Basilewsky.)

Body elongate, naked; tail short, tapering to a point; no barbels; margin of the upper jaw formed by the premaxillaries, the maxillaries well developed, lying behind them and parallel with them; lips thick; palatine teeth small, in a narrow band; gill-opening confluent into a ventral slit, the membrane united to the isthmus; gill-arches three, with gill-fringes rudimentary, and with moderate slit between them; no accessory breathing sac; lateral line present; no pectoral or ventral fins; dorsal and anal reduced to low folds; ribs present; no air-bladder; stomach without cæcal sac or pyloric appendages. Ovaries with oviducts. (Jordan & Snyder).

49. *Fluta alba* (Zuiew).

Taunagi (Japan); Senhii (Formosa).

- 1793. *Muræna alba* ZIEW, Nov. Act. Sci. Petropol, p. 229, Pl. VII, Fig. 2.
- 1798. *Monopterus javanois* LACÉPÈDE, Hist. Nat. Poiss., II, p. 139; Java.
- 1801. *Monopterus javanensis* BLOCH & SCHNEIDER, Syst. Ichth., p. 565, after Lacépède.—CANTOR, Malayan Fishes, 1850, p. 339, Pl. V, Figs. 6-8.—BLEEKER, Atlas Ichth. Mur., 1864, p. 118, Pl. XLVII, Fig. 1; Java; Sumatra; Banka; Bintang, Borneo; Celebes.—GÜNTHER, Cat. Fish., VIII, 1870, p. 14; Batavia; Borneo; Siam; Formosa; China; Japan.—DAY, Fish. Brit.

- India, 1876, p. 656, Pl. CLXIX, Fig. 1; Burma; China.—GÜNTHER, Ann. Mus. St. Petersburg, 1896, p. 219; Kansu; Sze-chuen.—REGAN, Ann. Mag. Nat. Hist. (7), XIII, 1904, p. 194; Yunnan.
1803. *Unibranchapertura laevis* LACÉPÈDE, Hist. Nat. Poiss., V, p. 658, Pl. XVII, Fig. 3.
1846. *Monopterus laevis* RICHARDSON, Voy. Sulph., Ichth., p. 116; Hongkong.
1845. *Ophicardia pharyngiana* McCLELLAND, Calcutta Journ. Nat. Hist., V, pp. 191, 218, Pl. XII, Fig. 1; River Ganges.
1846. *Monopterus cinereus* RICHARDSON, Voy. Sulph. Ichth., p. 117, Pl. LII, Figs. 1-6; Chusan; Woosung.
1846. *Monopterus (?) xanthognathus* RICHARDSON, Voy. Sulph. Ichth., p. 118, Pl. LII, Fig. 7; Canton.
1846. *Monopterus marmoratus* RICHARDSON, Ichthyol. China, p. 315; Chusan.
1846. *Monopterus helvolus* RICHARDSON, Ichthyol. China, p. 316; Canton.
1855. *Apterigia saccogularis* BASILEWSKY, Nouv. Mem. Soc. Nat. Mosc., X, p. 247, Pl. II, Fig. 2; Tschili.
1855. *Apterigia nigromaculata* BASILEWSKY, l.c., p. 248, Pl. II, Fig. 2; Peking.
1855. *Apterigia immaculata* BASILEWSKY, l.c., p. 248; Peking.
1897. *Monopterus albus* RUTTER, Proc. Acad. Nat. Sc. Philad., p. 61; Swatow.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, p. 838; Okinawa; Amami-Oshima.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 324; Hokota, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, 1909, p. 171; Hokoto.—JORDAN & METZ, Mem. Carneg. Mus., VI, 1913; No. 2, p. 24; Suigen, Corea.—JORDAN, SNYDER & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 76; Corea; Japan; Riukiu.

Head 10.17 in total length, its depth greater than that of the body, 1.66 in its length; depth 20.33 in total length; tail 3.5 in the length of body; snout 5 in head; interorbital space 6.

Body elongate, compressed, tapering towards the tip of tail, greatest diameter at the occiput, dorsal profile ascending suddenly at the nape and descending slowly to the tip of snout; cross-section of the body oval; head swollen; throat pouch-like; snout rather short, compressed, pointed anteriorly; lips broad and fleshy; maxillaries contained twice in head; teeth on both jaws granular, forming a band tapering towards the angle of mouth; palatine and vomerine teeth granular, forming two bands parallel to the former, lower jaw with corresponding bands of granular teeth along the inner side of the outer teeth; eyes very small, eight times in head and covered by thin skin; nostrils very small, separated, one in front of eye above, the other on the extremity of the snout; gill-openings inferior, confluent into a ventral slit; branchial arches three.

Dorsal fin very low, membranous, commencing above the vent, hind part reaching to tip of tail; anal fin indistinct, about half as long as the dorsal; no pectorals and ventrals; tail short and pointed.

Body naked, smooth; lateral line continuous, slightly depressed, running along the middle of the sides.

Color in formalin brownish gray above, mottled with darker spots, with traces of paler and darker streaks; lower surface, lips, and throat whitish.

Length of body 305 mm.

Described from a specimen from Shokwa, collected by T. Aoki in December, 1916.

Habitat: The present fish is very common in streamlets and canals. My specimens came from Jitsugetsutan (Lake Candidius); Shokwa; Taihoku; Kiburan, Giran.

Remarks: The color of the lower parts is variable. In two specimens from Taihoku the belly is mottled with brown, while another from the same locality has a nearly white belly with indistinct brown markings.

Fluta alba is capable of living a considerable time out of water.

MEASUREMENTS OF *Fluta alba*.

Locality.	Head.	Depth.	Depth of Head.	Tail in Trunk.	Interorbital.	Snout.	Length. Mm.
Shokwa.....	10.17	20.33	1.66	3.50	6	5	305
Taihoku.....	10.83	21.66	1.66	3.33	6.50	5.40	318
Taihoku.....	9.71	22.33	1.66	2.26	6.33	5.40	332
Taihoku.....	11.33	24.28	1.66	2.24	6.33	4.83	332
Kiburan.....	12.50	23.44	1.68	3.17	6	5	390

Family ANGUILLIDÆ.

Genus ANGUILLA Shaw.

1804. *Anguilla* SHAW, General Zoölogy, IV, p. 15. (Type *Muraena anguilla* Linnæus.)

Body elongate, compressed behind, covered with imbedded scales which are linear in form and placed obliquely, some of them at right angles to others. Lateral line well-developed. Head long, conical, moderately pointed, the rather small eye well forward and over the angle of mouth. Teeth small, subequal, in bands on each jaw and a long patch on the vomer. Tongue free at tip. Lips rather full, with a free margin behind, attached by a frenum in front. Lower jaw projecting. Gill-openings rather small, slit-like, about as wide as base of pectorals and partly below them. Nostrils superior, well-separated, the anterior with a slight tube. Vent close in front of anal. Dorsal inserted at some distance from the head, confluent with the

anal around the tail. Pectorals well-developed. (Jordan & Snyder.)

Distribution: Cosmopolitan, but not extending into the arctic regions.

SYNOPSIS OF THE FORMOSAN SPECIES.

- A. Mandibulary band of teeth is longitudinally divided by a groove, the outer strip containing a series of somewhat larger teeth.
- a. Length of head less than the distance between the origins of dorsal and anal. *mauritiana*.
- aa. Length of head longer than the distance between the origins of dorsal and anal. *japonica*.
- B. Mandibulary teeth in narrow bands, without longitudinal groove.
- a. Angle of mouth below the posterior margin of eye; lips thick. *sinensis*.

50. *Anguilla mauritiana* Bennett.

Ounagi (Japan); Roma (Formosa).

1831. *Anguilla mauritiana* BENNETT, Proc. Comm. Zool. Soc., p. 128.—GÜNTHER, Cat. Fish. VIII, 1870, p. 25; East Indian Ocean and Archipelago; Formosa. Amboyna; Almorah; Ceylon; Philippine Islands; Islands of Johanna.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 325; Kotosho, Formosa.—EVERMANN & SEALE, Bull. U. S. Bur. Fish., XXVI, 1907, p. 56; Tarlac.—JORDAN & RICHARDSON, Bull. U. S. Bur. Fish., XXVII, 1908, p. 238; Calayan, Mindoro.—SEALE & BEAN, Proc. U. S. Nat. Mus., XXXIII, 1907, p. 239, Zamboanga.—ISHIKAWA, Journ. Coll. Agric. Tokyo, IV, 1914, p. 427; Japan proper; Bonin Island.
1864. *Murana maculata* BLEEKER, Ned. Tydschr. Dierk. I, p. 237.
1864. *Murana manilensis* BLEEKER, Atl. Ichthyol. IV, p. 10; Manila.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 325; Kotosho, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 171, Kotosho.
1867. *Anguilla (Murana) marmorata* KNER, Novara Fisch., III, p. 369; Hongkong.

Length of head 6.05 in the total length, .89 in the distance of the gill-opening from the origin of the dorsal, 1.68 in its distance from the vent; distance between origin of dorsal and anal slightly longer than head, length of head contained 1.03 in the former; distance from tip of snout to the origin of dorsal 3.03 in total length; length of the pectoral 3.64 in head; snout 4.77; length of upper jaw 2.7; diameter of eye 2.6 in snout, 2.4 in interorbital space; height of body in front of anus 15.62 in total length; length of pre-anal part 1.03 in post-anal part.

Body stout; angle of mouth extending far beyond the posterior margin of orbit; lips well developed, fleshy; jaws subequal; teeth on both jaws, maxillary and mandibular teeth divided by a longitudinal groove into two strips, teeth on both rows in a single series, those on the outer row larger; palate with a band of sub-equal, villiform teeth,

which is slightly broader and shorter than that of the maxillary and tapers posteriorly; nostrils separated, the anterior in a long tube, hanging over antero-lateral margin of snout, the posterior minute, in front of eye.

Body covered with rudimentary imbedded scales, linear in form, arranged in small groups and placed obliquely, at right angles to those of neighboring groups.

Color in formalin brownish gray above, mottled with dark brown; lower parts whitish; vertical fins grayish, mottled with dark; the pectoral dark gray with white outer margin.

Length of body 375 mm.

Described from a specimen from Giran.

Habitat: Very common on the island, often attaining a large size. My specimens came from Giran and Jitsugetsutan (Lake Candidius).

MEASUREMENTS OF *Anguilla mauritiana*.

Locality.	Giran.	Giran.
Total length.	370 mm.	445 mm.
Length of head.	62 "	67 "
Distance of gill-opening from origin of dorsal.	55 "	60 "
Distance of gill-opening from the vent.	110 "	125 "
Distance between origin of dorsal and anal.	64 "	80 "
Distance between tip of snout and origin of dorsal.	113 "	122 "
Length of the pectoral.	17 "	18 "
Length of snout.	13 "	14 "
Length of upper jaw.	20 "	23 "
Diameter of eye.	5 "	6 "
Interorbital space.	12 "	13 "
Height of body in front of vent.	24 "	27 "
Length of pre-anal part.	170 "	190 "
Length of post-anal part.	205 "	255 "

51. *Anguilla japonica* Temminck & Schlegel.

Unagi (Japan); Pehmoa (Formosa).

1847. *Anguilla japonica* TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., p. 258, Pl. CXIII, Fig. 2; Nagasaki.—BLEEKER, Verh. Bot. Gen., XXV, p. 51; Japan.—KNER, Novara Fisch., III, 1867, p. 370; Shanghai.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, 1901, p. 348; Yokohama.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 406; Mororan; Shiogama; Tokyo, Misaki.—JORDAN & METZ, Mem. Carneg. Mus., VI, no. 2, 1913, p. 24; Fusan; Suigen, Corea.—JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci., Tokyo, XXXIII, 1913, p. 76; Hakodate to Nagasaki.—ISHIKAWA, Journ. Coll. Agric. Tokyo, IV, 1914, p. 417; Japan; Formosa; Corea.

1855. *Muraena pkinensis* BAKSILEWSY, Nouv. Mem. Soc. Nat. Mosc., X, p. 246, Pl. III, Fig. 2; Peking.

1870. *Anguilla bostonensis* GÜNTHER (*part.*), Cat. Fish., VIII, p. 31; Japan; Formosa; China.—GÜNTHER, Ann. Mag. Nat. Hist. (7), 1898, I, p. 263; Newchang.
1903. *Anguilla remifera* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 325; Holoto, Formosa.
1909. *Anguilla sinensis* JORDAN & RICHARDSON (*part.*), Mem. Carneg. Mus., IV, no. 4, p. 171; Takao, Formosa.

Head 7.77 in the total length, 1.25 in the distance between gill-opening and origin of the dorsal; 1.94 in the distance between tip of snout and origin of the dorsal; distance between origins of dorsal and anal shorter than head, contained 1.24 in the latter; distance between tip of snout and origin of the dorsal 3.51 in total length; snout 5.09 in head; maxillary 3.11; pectoral 2.8; eye 2.2 in snout, 1.8 in inter-orbital space; length of body in front of anus 2.23 in total length; pre-anal part 1.72 in postanal part.

Angle of mouth extending to the posterior margin of the orbit; lips thick and fleshy; lower jaw slightly longer than the upper; teeth on both jaws and palatines in villiform bands, palatine band slightly longer and broader than that of maxillary, tapering posteriorly; maxillary and mandibular bands of teeth divided into two strips by a distinct deep groove, outer strip with two rows of teeth, inner strip somewhat broader than the outer, with two rows of teeth, in both strips number of rows increases anteriorly and their arrangement becomes irregular; nostrils separated, the anterior in a long tube, situated near antero-lateral extremity of the snout, the posterior nostril in front of eye, slit-like.

Pectoral fins longer than broad, marginal end acutely rounded; tip of the tail rounded.

Body covered with rudimentary imbedded scales, linear in form, arranged in small groups and placed obliquely at right angles to those of neighboring groups; lateral line continuous, running along the middle of the sides.

Color in formalin brownish gray above, lower parts whitish; dorsal and caudal fins disky; pectoral and anal fins whitish.

Length of body 445 mm.

Described from a specimen from Taihoku, collected by Oshima, in February, 1917.

Habitat: Very common in the fresh waters of Formosa.

Remarks: After examining forty-seven individuals of the common Formosan eel, Dr. Ishikawa expressed his belief that it is only a local

variety of *Anguilla japonica*, though minor differences exist between these two forms, as shown in the following table of relative proportions:

	<i>A. Japonica.</i>	Formosan Eel.
Total length.....	100.00.....	100.00
Distance from gill-opening to the origin of dorsal...	18.18.....	18.41
Length of head.....	12.35.....	12.70
Distance from gill-opening to vent.....	27.20.....	28.45
Distance from tip of snout to origin of dorsal.....	30.54.....	31.11
Distance between origins of dorsal and anal fins...	9.76.....	10.31
Length of pectoral.....	4.01.....	4.77
Length of upper jaw.....	3.24.....	3.20
Length of snout.....	2.16.....	2.14
Diameter of eye.....	1.02.....	1.11
Interorbital space.....	1.92.....	2.06
Height of body in front of anus.....	5.21.....	5.40
Ratio of pre-anal and post-anal parts.....	1:1.53.....	1:1.47
Number of vertebrae.....	115.65.....	115.57

Moreover, he has regarded *Anguilla remifera* from Hokoto which was described by Jordan & Evermann (*Proc. U. S. Nat. Mus.*, XXV, 1903, p. 325) as being also a variety of *A. japonica*, because the distinctive characters of that species, that is, longer and rather pointed pectoral fins (2.17 in head) and the distance from front of dorsal to front of anal slightly more than length of head, are the points which are to be seen in extreme variations among examples of *A. japonica* (*Journ. Coll. Agricul.*, IV, 1914, p. 426).

Four specimens of an eel in the Stanford collections (No. 21181; Takao, Formosa) which had been described by Jordan and Richardson under the name *Anguilla sinensis* were examined and compared with my specimens of the common Formosan eel. It appears that in the former the distance from gill-opening to origin of dorsal, distance from gill-opening to vent, distance from tip of snout to origin of dorsal, diameter of eye, and height of body in front of anus (average length) are somewhat greater, while the length of head, distance between origins of dorsal and anal, length of pectoral, length of upper jaw, length of snout, interorbital space are smaller. As shown in the following tables (III, V), however, these characters are variable and have no specific value.



I. THE AVERAGE LENGTH OF THE PARTS OF BODY OF FORMOSAN EEL.

	A.	
	<i>A. japonica.</i>	<i>sinensis.</i>
Total length.....	100.00.....	100.00
Distance from gill-opening to origin of dorsal.....	17.01.....	18.43
Length of head.....	12.42.....	12.12
Distance from gill-opening to vent.....	26.55.....	26.72
Distance from tip of snout to origin of dorsal.....	28.95.....	29.40
Distance between origins of dorsal and anal.....	10.72.....	9.64
Length of pectoral.....	4.15.....	4.09
Length of upper jaw.....	4.04.....	3.56
Length of snout.....	2.51.....	2.26
Diameter of eye.....	1.13.....	1.38
Interorbital space.....	2.19.....	1.73
Height of body in front of anus.....	4.51.....	4.73
Ratio of pre-anal and postanal parts.....	1:58.....	1:60

II. MEASUREMENTS OF ANGUILLA JAPONICA.

Actual Length in Mm.

Locality.	Taihoku.	Taihoku.	Taihoku.	Taihoku.	Taihoku.	Giran.
Total length.....	310 mm.	357 mm.	445 mm.	355 mm.	355 mm.	182 mm.
Head.....	41 "	46 "	56 "	47 "	46 "	22 "
Gill-opening to dorsal..	57 "	61 "	70 "	70 "	60 "	27 "
Gill-opening to vent...	87 "	98 "	110 "	96 "	95 "	46 "
Dorsal to anal.....	33 "	40 "	45 "	37 "	39 "	20 "
Upper jaw.....	12 "	15 "	18 "	12 "	14 "	7 "
Pectoral.....	13 "	16 "	20 "	14 "	15 "	6.5 "
Snout.....	8 "	9 "	11 "	8 "	10 "	4.5 "
Eye.....	3 "	5 "	5 "	4 "	4 "	2 "
Interorbital space....	7 "	8 "	9 "	7 "	9 "	4 "
Height of body.....	18 "	19 "	22 "	17 "	19 "	9 "
Snout to vent.....	124 "	142 "	163 "	141 "	138 "	68 "
Vent to tip of caudal..	186 "	215 "	282 "	214 "	217 "	114 "
Snout to dorsal.....	95 "	107 "	124 "	110 "	105 "	50 "

III. LENGTH IN PERCENT OF THE TOTAL LENGTH.

Locality.	Taihoku.	Taihoku.	Taihoku.	Taihoku.	Taihoku.	Giran.
Total length.....	100.00	100.00	100.00	100.00	100.00	100.00
Head.....	13.22	12.85	12.58	13.23	12.95	12.08
Gill-opening to dorsal.....	18.38	17.08	15.73	19.71	16.90	14.28
Gill-opening to vent.....	28.06	27.45	24.71	27.04	26.76	25.28
Dorsal to anal.....	10.64	11.20	10.11	10.42	10.98	10.98
Upper jaw.....	3.87	4.20	4.04	3.38	3.94	3.82
Pectoral.....	4.19	4.47	4.49	3.97	4.22	3.57
Snout.....	2.58	2.52	2.47	2.25	2.81	2.47
Eye.....	0.96	1.40	1.11	1.12	1.12	1.09
Interorbital space.....	2.25	2.24	2.02	1.97	2.53	2.18
Height of body.....	5.80	5.32	4.94	4.78	5.35	4.92
Snout to vent.....	40.00	39.80	36.62	39.71	38.87	37.35
Vent to tip of caudal.....	60.00	60.22	63.37	60.28	61.12	62.69
Snout to dorsal.....	30.64	30.00	27.86	30.98	26.76	27.47

IV. MEASUREMENTS OF *ANGUILLA SINENSIS*, JORDAN & RICHARDSON.

(No. 21181, Stanford Collection, Takao.)

Actual Length in Mm.

Locality.	Taihoku.	Taihoku.	Taihoku.	Giran.
Total length	405 mm.	425 mm.	375 mm.	435 mm.
Head	50 "	54 "	44 "	51 "
Gill-openings to dorsal	80 "	74 "	68 "	79 "
Gill-openings to vent	120 "	110 "	94 "	114 "
Dorsal to anal	43 "	41 "	33 "	41 "
Upper jaw	15 "	15 "	12 "	13 "
Pectoral	18 "	15 "	15 "	19 "
Snout	10 "	10 "	8.5 "	9 "
Eye	4 "	4.5 "	3.5 "	4 "
Interorbital space	7 "	7 "	7 "	7.5 "
Height of body	23 "	19 "	16 "	20 "
Snout to vent	160 "	160 "	139 "	165 "
Vent to tip of caudal	236 "	265 "	236 "	270 "
Snout to dorsal	123 "	124 "	110 "	125 "

V. LENGTH IN PERCENT OF THE TOTAL LENGTH.

Locality.	Taihoku.	Taihoku.	Taihoku.	Giran.
Total length	100.00	100.00	100.00	100.00
Head	12.34	12.70	11.73	11.72
Gill-opening to dorsal	19.75	17.70	18.13	18.16
Gill-opening to vent	29.87	25.88	25.06	26.20
Dorsal to anal	10.64	9.64	8.99	9.42
Upper jaw	3.70	3.52	3.20	2.98
Pectoral	4.44	3.52	4.06	4.36
Snout	2.44	2.29	2.26	2.06
Eye	0.98	1.00	0.93	0.91
Interorbital space	1.72	1.64	1.85	1.72
Height of body	5.68	4.47	4.27	4.59
Snout to vent	41.72	36.64	37.06	37.93
Vent to tip of caudal	58.27	62.35	62.93	62.06
Snout to dorsal	30.37	29.17	29.33	28.73

52. *Anguilla sinensis* McClelland.

1844. *Anguilla sinensis* McCLELLAND, Calc. Journ., IV, p. 406, Tab. 25, Fig. 2; China.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 325; Taihoku, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 171; Taihoku.

1870. *Anguilla latirostris* GÜNTHER, Cat. Fish., VIII, p. 32; China (*part*).

1914. *Anguilla sinensis* (?) ISHIKAWA, Journ. Coll. Agric. Tokyo, p. 428; Tokyo.

A small specimen, No. 6447, from Taihoku. It agrees with Günther's account of *A. latirostris*, but that species was originally described from Nice. The long head, greater than the distance from front of dorsal to front of anal, is characteristic of this species. (Jordan & Evermann.)

Habitat: Taihoku (Jordan & Evermann).

Remarks: This specimen may not be different from the common eel, *Anguilla japonica*. As I have no specimens to examine, nothing more can be said of it at present.

Family MUGILIDÆ.

ARTIFICIAL KEY TO THE FORMOSAN GENERA OF MUGILIDÆ.

- A. An adipose eye-lid well developed, covering at least a third of the iris posteriorly. *Mugil*.
 B. Adipose eye-lid not developed. *Liza*.

Genus MUGIL (Artedi) Linnaeus.

1758. *Mugil* (ARTEDI) LINNÆUS, Syst. Nat., Ed. X, p. 316. (Type *Mugil cephalus* Linnaeus.)

Body more or less oblong and compressed, covered with cycloid scales of moderate size; no lateral line. Mouth more or less transverse; anterior margin of the mandible sharp, sometimes ciliated. No true teeth in the jaws. Gill-openings wide; gills four. Eyes lateral, with adipose eyelids. Two dorsal fins, the first consisting of four stiff spines; anal slightly longer than the second dorsal; ventrals abdominal, with one spine and five rays. Branchiostegals from four to six; pseudobranchiæ present.

Distribution: Migratory fishes of all the temperate and tropical regions.

SYNOPSIS OF THE FORMOSAN SPECIES.

- A. Median dorsal line not carinate.
 a. Mandibular angle obtuse; cleft of mouth contained two times in the distance between the angles of mouth. *cephalus*.
 aa. Mandibular angle a right angle; cleft of mouth contained less than two times in the distance between the angles of mouth. *oeur*.
 B. Median dorsal line carinate in front and back of the spinous dorsal.
 a. Mandibular angle obtuse; cleft of mouth contained less than two times in the distance between the angles of mouth. *carinatus*.

53. *Mugil cephalus* Linnaeus.

Bora (Japan); Oahii (Formosa).

1758. *Mugil cephalus* LINNÆUS, Syst. Nat., Ed. X, p. 316; Europe.—CUV. & VAL., Hist. Nat. Poiss., XI, 1830, p. 307.—GÜNTHER, Cat. Fish., 111, 1861, p. 417; Mediterranean; Coast of Madeira; Nile; fresh-water lakes of Tunis; West coast of Africa.—JORDAN & STARKES, Proc. U. S. Nat. Mus., XXXI, 1906, p. 516; Port Arthur.—JORDAN & SEALE, Proc. U. S. Nat. Mus., XXIX, 1906, p. 521; Hongkong; Shanghai.—JORDAN & RICHARDSON,

Bull. U. S. Bur. Fish., XXVII, 1908, p. 244; Calayan, p. 1.—SNYDER, Proc. U. S. Nat. Mus., XLII, 1912, p. 416; Misaki; Tokyo.—Proc. U. S. Nat. Mus., XLII, 1912, p. 459; Okinawa.—JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 113; Hawaii; Tahiti; Atlantic coast of the United States; Panama; Southern California; Red Sea; Mediterranean; New Guinea; Nukahiva; Solomon Island.—JORDAN & METZ, Mem. Carneg. Mus., VI, no. 2, 1913, p. 26; Fusan, Corea.—JORDAN & THOMPSON, Mem. Mem. Carneg. Mus., VI, no. 4, 1914, p. 239; Matsushima; Osaka.
1855. *Mugil soiu* BASILEWSKY, Ichthyol. China, p. 226, Pl. IV, Fig. 3; China.

Head 3.86 in length; depth 4.42; D. IV, 1, 8; A. III, 8; P. 17; V. I, 5; width of head 1.55 in its length; eye 4.23 in head; interorbital space 2; snout 3.5; forty-two scales in a lateral series, fifteen scales in an oblique series between origin of dorsal and middle of belly, thirteen scales between origins of dorsal and ventral.

Body rather robust, elongate, somewhat compressed, dorsal profile nearly straight, ventral profile broadly rounded; head rather small, broad, its top flattened; snout short and obtuse, broadly rounded anteriorly, interorbital space very broad, rather flat; mouth subinferior, slightly oblique, its angle reaching a vertical through posterior nostril; cleft of mouth half as deep as broad (between the angles of mouth); lips thin; the angle between two mandibular bones obtuse; lower jaw shorter than the upper, outer edge rather sharp, with an obtuse short median keel at the anterior part which fits into the corresponding concavity on the roof of upper jaw; teeth along the outer edges of both jaws minute, scarcely visible without lens; eyes hidden anteriorly and posteriorly by a broad adipose membrane; nostrils separated, anterior nostril in a very short tube, posterior nostril slit-like, in front of eye above.

Dorsal fins well separated, origin of the spinous dorsal midway between tip of snout and base of caudal, with a pointed scaly flap at the base, length of the anterior spine 2.2 in head; soft dorsal inserted behind the origin of anal, anterior ray longest; pectoral reaching beyond the origin of ventral, not reaching the spinous dorsal, its base above the middle of body; ventral a little nearer the root of pectoral than the spinous dorsal; anal fin opposite the soft dorsal, inserted in advance of the origin of the latter; caudal fin bifurcate; depth of the caudal peduncle 2.66 in the length of head.

Head and body covered with large cycloid scales, those on top of head slightly enlarged; soft dorsal, anal, and pectoral with very few scales; base of caudal covered with large scales.

Color in alcohol grayish above, lower parts silvery; sides with dark longitudinal stripes along the rows of scales; pectorals, dorsals, and caudal fin dusky; ventrals and anal whitish.

Length of body 255 mm.

Described from a specimen from Daitotei Fish Market, Taihoku, collected by Oshima in March, 1917.

Habitat: Taihoku (?). A very common species in Formosa.

Remarks: All the characters of the present species agree quite well with those of *M. cephalus* from Italy in the Stanford University Collections.

MEASUREMENTS OF *Mugil cephalus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Cleft of Mouth.	Scales.	Length, Mm.
Taihoku.....	3.86	4.42	IV, 1, 8	III, 8	17	1, 5	1.55	2	3.50	4.23	2	42-15	255
Taihoku.....	3.95	4.79	IV, 1, 8	III, 8	16	1, 5	1.50	2.38	3.11	4.58	2	40-15	284
Venice, Italy. (No. 1479, S. U.)..	3.94	4.14	IV, 1, 8	III, 8	16	1, 5	1.45	2.80	3.20	4.73	2	42-15	260
Naples, Italy. (No. 1469, S. U.)..	3.69	4.09	IV, 1, 8	III, 8	16	1, 5	1.50	2.52	3.65	4.85	2	41-15	220

54. *Mugil oeur* Forskål.

1775. *Mugil oeur* FORSKÅL, p. XIV, No. 109.—RUTTER, Proc. Acad. Nat. Sc. Philad., 1897, p. 70; Swatow, China.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIII, 1901, p. 744; Yokohama.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 332; Taihoku, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, 1909, p. 176; Giran; Keelung; Taihoku, Formosa.
1836. *Mugil cephalotus* CUV. & VAL., Hist. Nat. Poiss., XI, p. 110; India.—GÜNTHER, Cat. Fish., III, 1861, p. 419; Red Sea; Coast of Pondicherry, Chinese and Japanese Seas.—KNER, Novara Fisch., II, 1865, p. 224; Manila.
1846. *Mugil japonicus* SCHLEGEL, Fauna Japonica, Poiss., p. 134, Pl. 72, Fig. 1.—RICHARDSON, Ichthyol. China, 1846, p. 247; China.—BLEEKER, Verh. Batav. Genootsch., XXV, 1853, p. 41
1846. *Mugil macrolepidotus* RICHARDSON, Ichthyol. China, p. 249; China.
1905. *Mugil cephalus* JORDAN & SEALE (not of Linnaeus), Proc. Davenport Acad. Sc., X, p. 4; Hongkong.

Head 3.6 in length; depth 4; D. IV, 1, 8; A. III, 8; P. 16; V. I, 5; width of head 1.58 in its length; eye 4 in head; interorbital space 2.64; snout 3.75; thirty-nine scales in a lateral series, fifteen scales between origin of the spinous dorsal and ventral.

Body oblong, compressed posteriorly, dorsal and ventral profiles equally arched; head rather small, its top very slightly convex; snout

short, moderately broad, truncate in front, interorbital space rather flat; mouth subinferior, slightly oblique, its angle reaching a vertical through anterior margin of orbit, cleft of mouth 1.66 in the transverse distance between angles of mouth; lips rather thin, upper lip much thicker than the lower; the angle between two mandibular bones a right angle; lower jaw shorter than the upper, its outer edge rather sharp, with a short median keel at the tip which fits into the corresponding concavity on the roof of the upper jaw; teeth on the upper jaw minute, scarcely visible without a lens, closely set; eyes hidden anteriorly and posteriorly by a broad adipose membrane; nostrils separated, anterior nostril in a very short tube, posterior nostril slit-like, in front of eye above.

Dorsal fins well separated; origin of the spinous dorsal midway between tip of snout and base of caudal, with pointed scaly flaps on both sides of the base, length of the anterior spine twice in head; soft dorsal inserted behind the origin of anal, anterior ray longest; pectoral not reaching spinous dorsal, its base above the middle of body; ventral inserted nearer the origin of the spinous dorsal than that of the pectoral, with a scaly, pointed flap near the base; anal fin opposite the soft dorsal, inserted in front of the origin of the latter, caudal fin forked; depth of caudal peduncle 2.66 in head.

Head and body covered with large cycloid scales; all the fins except the spinous dorsal with very few scales; base of the caudal covered with large scales.

Color in alcohol dark gray above, belly and lower half of the sides silvery; sides with dark longitudinal stripes along the rows of scales; pectorals, dorsals, and caudal fin dusky, other fins whitish; a black spot near the base of pectoral.

Length of body 132 mm.

Described from a specimen from Inzanpo, Giran, collected by T. Aoki in August, 1917.

Habitat: Inzanpo and Ritakukan, Giran. Giran; Keelung; Taihoku. (Jordan and Evermann.)

Remarks: The present species is very closely related to *Mugil cephalus* Linnæus, differing mainly in the angle between the two mandibular bones. In the latter it is always obtuse instead of being a right angle, and the cleft of the mouth is contained twice in the distance between the angles of mouth.

MEASUREMENTS OF *Mugil oour*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Cleft of Mouth.	Scales.	Length, Mm.
Inzanpo	3.6	4	IV, 1, 8	III, 8	16	I, 5	1.58	2.64	3.75	4	1.66	39-15	132
Ritakukan	3.5	4	IV, 1, 8	III, 8	16	I, 5	1.58	2.50	3.75	4.66	1.50	39-15	133
China (No. 1606, S. U.)	3.91	4.37	IV, 1, 8	III, 8	16	I, 5	1.50	2.58	3.92	1.77	1.77	40-15	226
Hongkong (No. 9884, S. U.)	3.89	4.58	IV, 1, 8	III, 8	16	I, 5	1.61	2.47	3.70	3.70	1.57	38-15	166
Hongkong (No. 9884, S. U.)	3.87	4.38	IV, 1, 8	III, 8	16	I, 5	1.57	2.62	3.55	3.55	1.50	40-15	152
Hongkong (No. 9884, S. U.)	3.42	4.50	IV, 1, 8	III, 8	16	I, 5	1.61	2.75	3.66	3.66	1.57	41-16	150
Hilo, Hawaii. (No. 7852, S. U.)	4.11	4.25	IV, 1, 8	III, 8	16	I, 5	1.48	2.14	3.75	3.75	1.75	38-15	236
Hilo, Hawaii. (No. 7852, S. U.)	3.96	4.10	IV, 1, 8	III, 8	16	I, 5	1.47	2.18	3.64	4	1.89	40-15	260
Hilo, Hawaii. (No. 7852, S. U.)	3.85	4.12	IV, 1, 8	III, 8	17	I, 5	1.24	2.47	3.60	4	1.71	41-15	176

55. *Mugil carinatus* (Ehrenberg) Cuv. & Val.

1830. *Mugil carinatus* (EHRENBERG) CUV. & VAL., Hist. Nat. Poiss., XI, p. 148; Red Sea.—DAY, Fish. Brit. India, 1888, Suppl., p. 800; Sea of India.

Head 4 in length; depth 4.19; D. IV, 2, 7; A. III, 9; P. 15; V. I, 5 width of head 1.58 in its length; eye 3.7 in head; interorbital space 2.79; snout 4; thirty-nine scales in a lateral series, thirteen scales in a transverse series between origin of the dorsal and the middle of belly, eleven scales between origins of the dorsal and ventral; pectoral 1.5 in head; ventral 1.73.

Body elongate, compressed posteriorly, curvature of the dorsal profile weaker than that of the ventral, median dorsal line keeled in front and behind the spinous dorsal; head rather small, top more or less convex; snout short, truncate in front; mouth subinferior, its angle reaching a vertical through the posterior nostril, depth of the mouth 2.66 in its width; upper lip rather thick; lower jaw shorter than the upper; the angle between the mandibular bones obtuse; upper jaw with a series of minute uniform teeth along the outer border, lower jaw with a series of fleshy tubercles along its inner margin; pre-orbital not scaled, wavy, lower margin finely serrated; extremity of maxillary visible; eyes moderate, anterior, with narrow adipose eyelids; posterior nostril slit-like, nearer to the anterior nostril than the orbit.

Dorsal fins well separated; spinous dorsal inserted much nearer tip

of snout than base of caudal, higher than the soft dorsal, height of the first spine equal to the width of head; tenth and twenty-eighth scales of lateral series below the origins of the two dorsals, soft dorsal inserted behind the origin of the anal; pectoral fin extending beyond the root of the ventral, tip reaching to tenth scale of lateral series; ventrals inserted midway between pectorals and spinous dorsal; anal fin opposite the soft dorsal, anterior ray longest; caudal fin forked; depth of caudal peduncle 2.22 in the length of head.

Body covered with large cycloid scales; head entirely scaled; soft dorsal, anal, pectorals, ventrals, and base of the caudal covered with small scales; spinous dorsal and ventrals with pointed scaly flaps.

Color in formalin grayish above, lower parts silvery; pectorals, dorsals and caudal dusky, the rest of the fins whitish.

Length of body 185 mm.

Described from a specimen from Shimo-Tamusui River, collected by T. Aoki in December, 1916.

Habitat: Shimo-Tamusui River, Taihoku (collected in the fish-market).

MEASUREMENTS OF *Mugil carinatus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Shimo-Tamusui R. . .	4	4.19	IV, 2, 7	III, 9	15	1, 5	1.58	2.78	4	3.7	39-13	185
Taihoku	4.13	4.38	IV, 2, 7	III, 9	16	1, 5	1.57	2.94	4	4	39-13	220
Taihoku	4.26	4.85	IV, 2, 7	III, 9	16	1, 5	1.74	2.61	3.5	4	40-13	277

Genus LIZA Jordan & Swain.

1884. *Liza* JORDAN & SWAIN, Proc. U. S. Nat. Mus., VII, p. 261. (Type *Mugil capito* Cuvier.)

Body robust, more or less oblong and compressed, head and body covered with large cycloid scales; lateral line none. Mouth subinferior, more or less transverse; anterior margin of the mandible thin and sharp. Gill-openings wide. Eyes lateral and anterior, adipose eyelid obsolete. Two dorsal fins, the first consisting of four stiff spines; anal opposite the soft dorsal, slightly longer than the latter; ventrals abdominal, with one spine and five rays.

Distribution: British and Scandinavian coast; Canary Islands; Mediterranean; Nile; Freshwater lakes of Tunis; From Red Sea through Indian Ocean and Archipelago to the coasts of Australia and

to Polynesia; India; Ceylon; Philippine Islands; Indo-China; China; Formosa; Japan; Riukiu Islands.

56. *Liza troscheli* (Bleeker).

1858. *Mugil troscheli* BLEEKER, Nat. Tijdschr. Ned. Ind., XVI, p. 277.—Act. Soc. Sc. Indo-Neerl., VIII, 1860, p. 80; Sumatra.—GÜNTHER, Cat. Fish., III, 1861, p. 448; Coast of Java, Borneo, and Ceylon.—DAY, Fish. Brit. India, 1878, p. 358; Indian Sea to Malay Archipelago.—RUTTER, Proc. Acad. Nat. Sc. Philad., 1897, p. 70; Swatow.
1903. *Liza troscheli* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 332; Hokoto, Formosa.—JORDAN & SEALE, Bull. U. S. Bur. Fish., XXVI, 1906, p. 11; Cavite, P. I.—JORDAN & RICHARDSON, Bull. U. S. Bur. Fish., XXVII 1908, p. 244; Iloilo.—SMITH & SEALE, Proc. Biol. Soc. Wash., XIX, 1906, p. 76; Mindanao.—SEALE & BEAN, Proc. U. S. Nat. Mus., XXXIII, 1907, p. 240; Zamboanga.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, 1909, p. 176; Takao; Hokoto.—SNYDER, Proc. U. S. Nat. Mus., XXXII, 1912, p. 495; Okinawa.—JORDAN & STARKS, Ann. Carneg. Mus., XI, Nos. 3 and 4, 1917, p. 439; Ceylon.

Head 4.3 in length; depth 4; D. IV, 2, 7; A. III, 9; P. 14; V. I, 5; width of head 1.46 in its length; eye 4 in head; interorbital space 2.28; snout 3.64; pectoral 1.31; ventral 1.42; thirty-one scales in lateral series, eleven scales in an oblique series between origin of dorsal and the middle of belly, nine scales between origins of dorsal and ventral.

Body robust, compressed posteriorly, the ventral profile much more curved than the dorsal, deepest in front of the vent; head rather small, top slightly convex; snout nearly as long as the diameter of eye, obtusely rounded anteriorly; mouth subinferior, its cleft one-third as deep as the distance between the angles of mouth; upper lip thick, no lower lip; lower jaw slightly shorter than the upper, angle between two mandibular bones obtuse, outer edge of mandible thin and sharp; upper jaw with no teeth, lower jaw with a series of minute fleshy tubercles along the inner margin; pre-orbital edge more or less wavy, lower part indistinctly denticulated; eyes moderate, anterior, adipose eyelid not well developed; nostrils separated, the anterior in a very short tube, the posterior slit-like.

Dorsal fins well separated; origin of the spinous dorsal nearer to base of caudal than tip of snout, as high as the soft dorsal, length of the first spine shorter than the width of head; soft dorsal inserted behind the origin of anal, eleventh and twentieth scales of lateral series below the origins of the dorsals; pectorals a little above the middle of body, reaching eighth scale of lateral series; the ventral inserted mid-

way between origin of pectoral and that of spinous dorsal; the anal inserted in advance of the origin of soft dorsal; caudal fin emarginate; depth of caudal peduncle twice in the length of head.

Head and body covered with large cycloid scales; soft dorsal, anal, and base of ventral and caudal covered with small scales; spinous dorsal and ventral with pointed scaly flaps.

Color in formalin grayish above, lower parts silvery; sides with longitudinal stripes along the rows of scales; pectorals, dorsals, and caudal dusky, the rest of the fins whitish.

Length of body 215 mm.

Described from a specimen from Sobun River near Tabani, collected by T. Aoki in December, 1916.

Habitat: Sobun River near Tabani (two specimens). Hokoto (Jordan and Evermann); Takao (Jordan and Richardson).

MEASUREMENTS OF *Liza troscheli*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Sobun River.	4.3	4	IV, 2, 7	III, 9	I, 4	I, 5	1.46	2.28	3.64	4	31-11	215
Sobun River.	4.3	3.58	IV, 1, 8	III, 9	I, 5	I, 5	1.42	2.13	3.40	4.17	31-11	272

Family LABYRINTHICI.

ARTIFICIAL KEY TO THE FORMOSAN GENERA.

- a. Teeth fixed in the jaws; none on the palate; ventrals well-developed; 13-20 dorsal or anal spines; dorsal and anal rays not filamentous; caudal fin rounded. *Polyacanthus*.
- aa. Teeth fixed in the jaws; none on the palate; ventrals well-developed; 13-18 dorsal or anal spines; middle rays of the dorsal and anal filamentous; caudal fin forked or ending in a bundle of long filaments. *Macropodus*.

Genus POLYACANTHUS (Kuhl) Cuvier.

1829. *Polyacanthus* (KUHLE) CUVIER, Regne Animal, Ed. II, Vol. II, p. 227. (Type *Chatodon chinensis* Bloch = *Labrus operculatus* Gmelin, as restricted by Cuvier & Valenciennes.)

Body compressed, oblong; operculum without spine or serrature; cleft of mouth small, more or less oblique, not extending beyond a vertical from orbit, and little protractile. Small fixed teeth in the jaws, none on the palate. Dorsal and anal spines numerous (13-20); ventral fins composed of one spine and five well-developed rays; the



soft dorsal and anal, the caudal and ventral more or less elongate in the mature specimens, but not filamentous; caudal rounded. Lateral line interrupted or absent. Branchial arches with toothed tubercles. Air-bladder simple; pseudobranchiæ none (glandular). Pyloric appendages in small number; intestine with many circumvolutions.

Distribution: Java; Sumatra; Borneo; Ceylon; Malabar; China; Formosa.

57. *Polyacanthus operculatus* (Linnæus).

Taiwan-kingyo (Formosa).

1735. *Labrus opercularis* LINNÆUS, Amœn. Acad., IV, p. 428 (not binomial).
 1789. *Labrus operculatus* GMELIN, Syst. Nat., p. 1286; Asia (after Linnæus).
 1785. *Chatodon chinensis* BLOCH, Ichthyologie, VII, p. 3, Taf. 218, Fig. 1; China.
 1831. *Polyacanthus chinensis* CUV. & VAL., Hist. Nat. Poiss., VII, p. 357.—RICHARDSON, Ichthyol. China, 1846, p. 250; Canton.
 1842. *Macropodus ocellatus* CANTOR, Ann. Mag. Nat. Hist., IX, p. 484; Chusan.
 1846. *Polyacanthus? opercularis* RICHARDSON, Ichthyol. China, p. 250; China.
 1846. *Polyacanthus? paludosus* RICHARDSON, Ichthyol. China, p. 250; Canton.
 1861. *Polyacanthus opercularis* GÜNTHER, Cat. Fish, III, p. 379; Chusan; Hongkong; China.—Ann. Mag. Nat. Hist., Sept., 1873, p. 243; Shanghai.—PETERS, Monatsb. Ak. Berlin, 1880, p. 923.—Abbott, Proc. U. S. Nat. Mus., XXIII, 1901, p. 490; Tien-tsin.

Head 3 in length; depth 2.75; D. 14, 6; A. 20, 13; P. 10; V. 2, 4; width of head 1.66 in its length; eye 3.66 in head; interorbital space 2.8; snout 4; twenty-eight scales in a lateral series, six scales between orbit and posterior margin of operculum, twelve scales in an oblique series between origin of dorsal and the root of ventral.

Body oblong, compressed, dorsal and ventral profiles equally arched; head moderate, triangular, entirely covered with scales; operculum with no spine or serrature; snout pointed anteriorly, interorbital space more or less convex; mouth small, terminal and subvertical, its angle not reaching the orbit; lower jaw slightly protruding; both jaws with small, fixed, villiform teeth; eyes rather large, anterior; nostrils separated, the anterior approximating the upper lip, the posterior in contact with eye.

Origin of the dorsal much nearer tip of snout than base of caudal, inserted behind that of anal, soft rays much longer than the spinous, the anterior longest, reaching middle of caudal; pectoral fins thoracic, the tips reaching beyond the anterior third of anal; anal fin very long, its base longer than that of dorsal, soft rays elongate, extending beyond the middle of caudal; caudal fin oblong, rounded at the tip;

caudal peduncle very short, its depth less than twice in the length of head.

Scales large, ctenoid; lateral line indistinct, visible only on the anterior nine scales.

Color greenish gray, with ten brown cross-bars on the sides, one of which is on the nape; a dark brown, round spot on the extremity of gill-cover, a somewhat paler short streak between the orbit and that spot; caudal fin with two brown cross-bars near the base; dorsal and caudal fins speckled with brown; base of the anal brownish; pectoral and ventral fins whitish.

Length of body 58 mm.

Described from a specimen from Taihoku, collected by Oshima in February, 1917.

Habitat: Abundant in the ditches and stagnant pools throughout the Island. My specimens came from Taihoku; Wodensho, Taichu.

MEASUREMENTS OF *Polyacanthus operculatus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Taihoku	3	2.75	14, 6	20, 13	10	2, 4	1.66	2.80	4	3.66	28-12	58
Taihoku	2.83	2.83	14, 6	19, 13	10	2, 4	1.71	3	4	3.33	28-12	43
Taihoku.....	2.91	2.91	14, 6	19, 13	10	2, 4	1.83	2.75	4	3.50	28-12	42
Taihoku.....	2.90	2.90	13, 7	19, 13	10	2, 4	1.83	2.75	3.50	3	28-12	39
Taihoku.....	2.77	2.77	13, 7	18, 13	10	2, 4	2	3	3.33	3.66	28-12	48

Genus MACROPODUS Lacépède.

1802. *Macropodus* LACÉPÈDE, Hist. Nat. Poiss., III, p. 416. (Type *Macropodus viridiauratus* Lacépède).

1861. *Macropus* GÜNTHER, Cat. Fish., III, p. 381. (Type *Macropodus viridiauratus* Lacépède.)

Body compressed, oblong; operculum without spine or serrature; cleft of mouth rather small, not extending beyond a vertical from the orbit. Small fixed teeth in the jaws, none on the palate. Dorsal and anal spines numerous (thirteen to eighteen); ventral fins composed of one spine and five rays, which are well-developed; soft dorsal, anal and caudal with long filamentous rays. Caudal fin forked or ending in a bundle of long filaments. Lateral line absent. Branchial arches with toothed tubercles. Pyloric appendages in small number; intestine of moderate length.

Distribution: Fresh waters of China, Cochin-China, and Botel Tobago.

58. *Macropodus filamentosus* sp. nov. (Plate LII, Fig. 2).

Head 3.2 in length; depth 3; D. 13, 8; A. 18, 15; P. 10; V. 1, 5; width of head 1.66 in its length; eye 3.5 in head, interorbital space 2.75; snout 3.5; twenty-eight scales in a lateral series, twelve scales in an oblique series between origin of dorsal and the root of the ventral, six scales between orbit and the posterior end of operculum.

Body oblong, compressed, tapering posteriorly, dorsal and ventral profiles equally arched; tail slightly turned downward (probably distorted); head moderate, triangular, entirely covered with scales, top convex; snout short, pointed anteriorly, interorbital space rather broad, slightly convex; operculum with no spine; minute denticulations at the pre-orbital and the angle of the pre-operculum; mouth anterior, oblique, its angle not reaching the orbit; both jaws with a band of fixed, villiform teeth, the lower jaw slightly protruding; nostrils separated, the anterior in a short tube, situated nearer the lip than orbit, the posterior nearly in contact with eye.

Dorsal fin elongate, inserted midway between tip of snout and base of caudal, soft rays much longer than the spines, fifth ray filamentous, reaching the middle of caudal; ventral with one spine and five rays, first ray filamentous, reaching anterior two-thirds of the base of anal; anal fin very long, its origin in advance of that of dorsal, posterior end of the base nearly in contact with the base of caudal, soft rays longer than the spines, middle rays longest, seventh to ninth rays filamentous, reaching beyond the end of dorsal filament; caudal fin gradually tapering posteriorly, middle rays elongated, forming a bundle of delicate filaments, not forked.

Scales moderate, ctenoid; with no lateral line; head provided with many mucous pores, four along the posterior margin of the upper lip, one on each side behind the posterior nostril, one in contact with the hind border of the orbit, three on the posterior part of pre-operculum; bases of the dorsal and anal covered with scales.

Color in alcohol pale grayish white, with about eleven brownish cross-bars on the sides and one of the same color on the base of the caudal; a dark brown round spot at the extremity of the operculum; postorbital space with traces of two brown streaks; membrane of the soft dorsal and upper half of the caudal speckled with black; base of the anal brownish, the rest of the fin whitish.

Length of the body excluding the caudal 43 mm. (caudal fin about 33 mm. long).

Described from a specimen from Kotosho (Botel Tobago Island), collected by Yonetaro Kikuchi.

Habitat: Kotosho (Botel Tobago Island). A single specimen.

Remarks: *Macropodus viridi-auratus* Lacépède¹⁰ = *Macropodus venustus* Cuv. & Val., may be identical with the present species. According to the description and figure by Cuvier and Valenciennes it is provided with a distinctly forked caudal, instead of forming a bundle of long filaments as in *M. filamentosus*.

Family KUHLIIDÆ.

Genus KUHLIA Gill.

1861. *Kuhlia* GILL, Proc. Ac. Nat. Sci. Philad., p. 48. (Type *Perca ciliata* Cuv. & Val.)
 1863. *Moronopsis* GILL, Proc. Ac. Nat. Sci. Philad., p. 82. (Type *Dules marginata* Cuv. & Val.)
 1872. *Paradules* BLEEKER, Nederl. Tijdschr. v. Dierk. I, p. 257. (Type *Dules marginata* Cuv. & Val.)

Body elongate, fusiform. Head conical. Six branchiostegals. All the teeth villiform, without canines; teeth on the palatine bones. Anterior dorsal fin sustained by nine spines, the posterior with a spine and about eleven articulated rays; anal fin with three spines. Operculum with two or three flat spines; pre-operculum serrated. Scales moderate, minutely serrated.

Distribution: Rivers of the intertropical regions (Java, Philippines, India, Ceylon, Formosa, Japan).

59. *Kuhlia marginata* (Cuv. & Val.).

Dokugyo (Japan).

1829. *Dules marginata* CUV. & VAL., Hist. Nat. Poiss., III, p. 116, Pl. LII; Java.—GÜNTHER, Cat. Fish., I, 1859, p. 268; Seas of Java, Amboyna, Vanicolo, Fiji Islands.—DAY, Fish. Brit. India, 1876, p. 67, Pl. XVIII, Fig. 1; Seas of India, Malay Archipelago.
 1903. *Kuhlia marginata* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 340; Kotosho, Formosa.—JORDAN & RICHARDSON, Bull. U. S. Bur. Fish., XXVIII, 1907, p. 254; Mindoro Island.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 183; Formosa.—JORDAN, SNYDER & TANAKA, Journ. Coll. Sci., Tokyo, XXXIII, 1913, p. 146; Japan.

Head 3.19 in length; depth 2.69; D. X, 11; A. III, 10; P. 14; V. I, 5; width of head 1.86 in its length; eye 4.5 in head; interorbital space 3;

¹⁰ *Macropodus viridi-auratus* Lacépède, Hist. Nat. Poiss., III, 1802, p. 417, Pl. 16, Fig. 1.

Macropodus venustus CUV. & VAL., Hist. Nat. Poiss., VII, 1831, p. 375, Pl. 197.

snout 3.4; pectoral 1.69; ventral 1.64; forty-two scales in the lateral line, four and one-half scales in an oblique series between origin of dorsal and lateral line, twelve scales between the latter and the middle of belly, nine scales between lateral line and the ventral; gill-rakers 5 + 18; six branchiostegals.

Body oblong, compressed, rather deep, dorsal and ventral profiles strongly convex; head moderate, with two sharp flat spines on the posterior margin of operculum, pre-opercles finely serrated; ventral surface of head convex and smooth; snout smooth, pointed anteriorly, interorbital space more or less convex; mouth oblique, with thin fleshy lips, its angles extending backward to the middle of the orbit below; lower jaw protruding; teeth on both jaws in villiform bands, vomer and palatines with a band of villiform teeth, no canine teeth; nostrils approximated, supralateral, in front of eye above, anterior nostril in a short tube.

Origin of the dorsal opposite that of ventral, much nearer tip of snout than base of caudal, elongate, fourth and fifth spines longest, soft rays higher than spines, the base covered with a scaly sheath; pectoral lateral, reaching beyond the middle of ventral; ventrals close together, each armed with a short strong spine, the end of the fin-membrane adnate to the belly, tip not reaching the anal; anal fin rather long, with three strong spines, second strongest but shorter than the third, inserted in front of the origin of first dorsal ray, the base of the fin covered with a scaly sheath; caudal fin rather broad, divergent, very slightly emarginate; caudal peduncle rather long, its depth 2.33 in length of head.

Body covered with moderate ctenoid scales; cheeks and operculum covered with scales; lateral line continuous, slightly upcurved, running along the middle of the tail.

Color in formalin dark grey above, belly and lower parts of sides yellowish; posterior margin of scales of the sides spotted with dark, their anterior margins finely speckled with black; dorsal fin dark gray, soft rays fuscous; pectorals dusky; ventrals white; membrane of the anal finely speckled with black; caudal fin dark brown.

Length of body 205 mm.

Described from a specimen from Tamusui River, collected by T. Aoki in December, 1916.

Habitat: Tamusui River near Shiuten; Choso River at Koshiryo; Giran River near Inzanpo; Bokusekikaku.

Remarks: The present species is one of the brackish water fishes which enter the streams.

MEASUREMENTS OF *Kuhlia marginata*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Tamusui River....	3.19	2.69	x, 11	III, 10	14	1, 5	1.86	3	3.40	4.50	4 $\frac{1}{2}$ -42-12	205
Tamusui River....	3	2.72	x, 11	III, 10	14	1, 5	1.81	3.27	3.27	4.18	5-40-13	181
Tamusui River....	3	2.63	x, 11	III, 10	14	1, 5	1.76	3.18	3.25	3.80	5-40-13	132
Inzanpo.....	3.12	2.75	x, 11	III, 10	14	1, 5	2	3	3.40	4	4-40-12	132
Koshiryo.....	3.28	2.66	x, 11	III, 10	14	1, 5	2	3	3.50	3.25	4 $\frac{1}{2}$ -40-12	104

Family OPHICEPHALIDÆ.

ARTIFICIAL KEY TO THE FORMOSAN GENERA OF OPHICEPHALIDÆ.

- A. Ventral fins present.....*Opficephalus*.
- B. Ventral fins absent.....*Channa*.

Genus OPHICEPHALUS Bloch.

1794. *Opficephalus* BLOCH, Naturg. Ausl. Fische, VIII, p. 137. (Type *Opficephalus punctatus* Bloch.)

Body elongate, subcylindrical anteriorly; head depressed, covered with plate-like scales. Eyes lateral. Gill-openings wide, the membranes of the two sides connected beneath the isthmus; four gills; pseudobranchiæ none. A cavity accessory to the gill-cavity, for the purpose of retaining water; no suprabranchial organ developed. Teeth in the jaws, vomer, and palate. One long dorsal and anal fin, without spines; ventral fins thoracic, composed of four to six rays, the outer of which is not branched. Lateral line interrupted. Air-bladder present.

Distribution: British India; Ceylon; Borneo; Sumatra; Mindanao; Luzon; Bengal; Siam; Hindostan; Indo-China; Formosa; China; Amur Province.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a. Depth of body less than 6 in the length; nine scales between orbit and the tip of operculum; eleven scales between lateral line and the root of ventrals. *tadianus*.
- aa. Depth of body more than 6 in the length; twelve scales between orbit and the tip of operculum; fourteen scales between lateral line and the root of ventrals. *maculatus*.

60. *Ophicephalus tadianus* Jordan & Evermann.

Raiihii (Formosa).

1903. *Ophicephalus tadianus* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 330; Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 193; Formosa.—VAILLANT, Bull. Mus. Hist. Nat., VI, 1904, p. 298; Tongking.

Head 3 in length; depth 5.33; D. 44; A. 28; V. 4; P. 16; width of head 2 in its length; eye 8 in head; interorbital space 5; snout 6; maxillary 3; mandible 2.25; pectoral 2.2; ventral 3; fifty-seven scales in a longitudinal series, four scales between origin of dorsal and lateral line, eleven scales between the latter and the root of ventral, sixteen scales between lateral line and the middle of belly; nine scales between orbit and the angle of pre-operculum.

Body torpedo-shaped, posterior part compressed, anterior part depressed; head rather elongate, depressed, its dorsal profile gradually inclined anteriorly; snout more or less produced, anterior margin obtusely rounded, interorbital space flat; eyes relatively small, superior and exceedingly anterior; nostrils separated, superior, the anterior in a short tube, in contact with the upper lip, the posterior in front of eye above; mouth oblique, large, its angle extending beyond the posterior margin of orbit; a band of small teeth on outer edge of jaws, a band of large, wide-set, caniniform teeth on palatine and inner side of lower jaw; upper jaw protractile, slightly shorter than the lower.

Dorsal fin very long, with numerous spine-like rays, low anteriorly, gradually lengthening posteriorly, when depressed the tip of fin reaching beyond root of caudal; the pectoral obtusely rounded, nearly twice as long as broad, reaching beyond the middle of ventral; ventral fins small, not reaching vent; anal similar to the dorsal, inserted beneath anterior third of the base of dorsal, when depressed reaching beyond the root of caudal; caudal fin squarish, with rounded tip; caudal peduncle very short, deep, strongly compressed laterally.

Body covered with rather large cycloid scales with irregular concentric rings and radiated striae; top of head and cheeks covered with large scales; lateral line discontinuous, undulating, running along the center of body from base of caudal to just over third anal ray, thence upward for two rows of scales, forward sixteen rows, downward one row, and then forward to edge of gill-opening.

Color in formalin olivaceous brown above, paler below; a row of twelve dark gray blotches along the base of dorsal, partly on the fin,

partly on body; below these, but above the lateral line, another row of nine similar, but larger, blotches, extending anteriorly to the upper posterior border of eye, running below the upward curve of lateral line and forming a continuous longitudinal band; below this another row of about seventeen similarly colored, irregular blotches, extending from the base of pectoral posteriorly along lower edge of lateral line to base of caudal; below this another row of irregular and lighter-colored blotches; head olivaceous brown, streaked with irregular lines of black above; a band of dark brown as wide as pupil, but becoming wider posteriorly, running from postero-inferior edge of eye to the middle of base of pectoral; lower part of head paler; dorsal fin marbled with dark; membrane of caudal fin dark, its rays dusky brown, two vertical stripes of gray color near the base; anal fin with seven dark blotches at the base of posterior half, its membrane dusky; the ventral pale; pectorals grayish, with no marking.

Length of body 220 mm.

Described from a specimen from Taihoku, collected by Oshima in October, 1916.

Habitat: Widely distributed throughout the Island. My specimens came from Taihoku, Raupi, Giran; Tozen River; Nanshisho, Giran.

MEASUREMENTS OF *Ophicephalus tadius*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Taihoku.....	3	5.33	44	28	16	4	2	5	6	8	4-57-14	220
Taihoku.....	2.83	5.50	41	25	15	4	2.2	4.66	6.33	8.25	4-54-14	215
Raupi.....	3	5.11	44	27	16	4	2	5.30	5.60	7.33	5-56-14	196

61. *Ophicephalus maculatus* Lacépède.

- 1802. *Bostrichus maculatus* LACÉPÈDE, Hist. Nat. Poiss., III, p. 140, 143.
- 1831. *Ophicephalus maculatus* CUV. & VAL., Hist. Nat. Poiss., VII, p. 437.—KNER, Novara, Fisch., II, 1865, p. 234; Hongkong.—BLEEKER, Naturk. Verh. A. K. Amst., XIX, 1879, p. 50; Philippine Islands.—RUTTER, Proc. Acad. Nat. Sc. Philad., 1897, p. 69; Swatow.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 330; Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, 1909, p. 193; Formosa.—JORDAN & RICHARDSON, Check-List Philip. Fish., 1910, p. 34; Manila.
- 1861. *Ophicephalus maculatus* GÜNTHER, Cat. Fish., III, p. 480; China.

Head 3.66 in length; depth 6.18; D. 40; A. 28; P. 17; V. 6; width of head 1.8 in its length; eye 8 in head; interorbital space 5; snout 6;

pectoral 2.19; ventral 3.45; fifty-six scales in a lateral series, five scales between origin of dorsal and lateral line, fourteen scales between the latter and the root of ventral, sixteen scales between lateral line and the middle of belly, twelve scales between orbit and the end of preoperculum.

Body spindle-shaped, posterior part compressed; head broad, depressed; snout rather short, obtusely rounded anteriorly, interorbital space flat; eyes small, superior, and exceedingly anterior; nostrils separated, the anterior in a short tube, on upper edge of maxillary, the posterior in front of eye above; mouth oblique, large, its angle extending beyond the posterior margin of orbit; maxillary 3 in head; mandible 2.66; lower jaw slightly longer than the upper; a row of large caniniform teeth on palatine and inner side of lower jaw, a band of small teeth on outer edge of both jaws.

The dorsal very long, with numerous spine-like rays, low anteriorly, when depressed reaching beyond the root of caudal; pectoral oval, outer margin rounded; ventrals rather small and slender, not reaching the vent; the anal similar to the dorsal, but not so long, inserted beneath the anterior third of the base of dorsal; caudal fin squarish, with rounded tip; caudal peduncle short and deep, greatly compressed.

Body covered with large cycloid scales with irregular concentric rings and radiating striae; head and cheek covered with plate-like scales; lateral line broken anteriorly, running along the middle of sides from the base of caudal to just above the second anal ray, thence upward for two rows of scales, forward thirteen rows, downward one row, then forward to the upper edge of gill-opening.

Color in formalin dark bluish gray above, paler below; belly dusky; eight large dark gray blotches above the lateral line, extending anteriorly to the middle of and beneath the upward curve of the lateral line, forming a more or less continued longitudinal band; below this another row of about fourteen similarly colored, large, irregular blotches, extending from the base of pectoral posteriorly to the base of caudal, running below the lateral line; interspace between the upper row of markings and the base of dorsal irregularly mottled with dark; upper surface of the head uniformly bluish gray, lower parts paler; a dark brown band from the upper posterior corner of the orbit running backward, entering the upper row of markings of the sides; below this is an irregular, more or less undulating streak of the same color from eye to middle of base of the pectoral; upper part of the dorsal

grayish, paler below, its membrane with a series of dark spots along the base; caudal fin uniformly gray, with a faint stripe near the base; anal fin gray, with indications of dark blotches at the posterior half of the base; ventral fins whitish, rays dusky; the pectoral gray.

Length of body 285 mm.

Described from a specimen from Wodensho, Taichu, collected by T. Aoki in December, 1916.

Habitat: Wodensho, Taichu (a single specimen).

Remarks: The present species is easily distinguished from *Ophicephalus tadianus* by its lower body; the greater number of scales between orbit and posterior angle of pre-operculum; and the greater number of scales in an oblique series between the lateral line and the root of ventral.

Genus CHANNA Gronow.

1703. *Channa* GRONOW, Zoöphyl., p. 135. (Type *Channa orientalis* Bloch & Schneider.)

Body elongate, subcylindrical anteriorly, compressed posteriorly; head slightly depressed, covered with plate-like scales. Eyes lateral and anterior. Gill-openings wide, membranes of the two sides connected beneath the isthmus. Fine teeth in the jaws, on the vomer, and the palatine bones, intermixed with larger ones in the lower jaw. Pyloric appendages none. One long dorsal and anal fin, without spine; ventral fins none. Lateral line broken anteriorly.

Distribution: Ceylon; China; Formosa.

62. *Channa formosana* Jordan & Evermann.

Kotai (Formosa).

1903. *Channa formosana* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 330; Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, 1909, p. 193; Suwata (after Jordan & Evermann).

Head 3.4 in length; depth 5; D. 44; A. 27; P. 14; width of head 1.6 in its length; eye 7 in head; interorbital space 3.5; snout 5; maxillary 2.5; mandible 2.2; pectoral 1.6; fifty-four scales in a lateral series, five scales between origin of dorsal and lateral line, thirteen scales between the latter and the middle of belly, about six scales between orbit and the angle of pre-operculum.

Body elongate, anterior part subcylindrical, compressed posteriorly; head rather broad, its top depressed; snout short, obtusely rounded anteriorly; mouth large, oblique, its angle extending beyond the

posterior margin of orbit; lower jaw slightly longer than upper; teeth in both jaws and on vomer, cardiform; eyes moderate, superior, and much anterior; nostrils widely separated, the anterior in a long tube, just behind the upper lip, the posterior in front of eye.

Dorsal fin elongate, beginning over the base of pectoral, the rays quite uniform in length, when depressed reaching beyond the root of caudal; anal fin similar to dorsal but shorter, beginning beneath the fifteenth dorsal ray and ending under the forty-second; rays of the dorsal and anal all unbranched; pectoral fin broad, not reaching the vent; no ventral fins; caudal fin broad and rounded; caudal peduncle short and deep, greatly compressed.

Lateral line broken anteriorly, running along the middle of the sides from the base of caudal to just above second anal ray, thence upward one row for one scale, again upward for one row, extending forward on seven scales, thence dropping one row, reaching to the upper extremity of gill-opening; body covered with large cycloid scales with irregular concentric lines and radiating striae; head and cheeks covered with plate-like scales.

Color in formalin yellowish brown above, paler below; the sides with about nine V-shaped dark cross-bars, the apex pointing forward, these markings clearer posteriorly and more or less broken and irregular in front; a large round black spot, bordered by white, on caudal

MEASUREMENTS OF *Channa formosana*.

Locality.	Head.	Depth.	D.	A.	P.	Width of Head.	Interorbital.	Snout.	Eye	Scales.	Length, Mm.
Taihoku	3.40	5	44	27	14	1.60	3.5	5	7	5-54-13	210
Taihoku	3.64	5.5	45	28	15	1.57	3.5	4.5	6.86	5-53-13	200

peduncle near the base of caudal fin; sides of head with two broad, dark streaks from eye to the posterior edge of operculum, more or less undulating; dorsal and anal fins uniformly dusky gray, their edge somewhat darker; other fins grayish white.

Length of body 210 mm.

The present description is from a specimen from Taihoku, collected by Oshima in September, 1916.

Habitat: Taihoku; Shori, Toyen; Tamusui River; Jitsugetsutan (Lake Candidius). One of the commonest fishes in ponds and stagnant pools.

Remarks: This species is very closely allied to *Channa ocellata*¹¹ from China. It differs in having no teeth on palatines and a greater number of scales in a transverse series.

Family GOBIIDÆ.

ARTIFICIAL KEY TO THE FORMOSAN GENERA.

- A. Ventral fins entirely separated; pectorals normal; eyes not erectile.
 - a. Pre-opercle with a concealed, hook-like spine; scales moderate, ctenoid; dorsal spines low; interorbital space without ridge..... *Eleotris*.
 - aa. Pre-opercle without spine; scales moderate, ctenoid; dorsal spine low; interorbital space with prominent ridges..... *Butis*.
- B. Ventrals joined at least at base.
 - a. Ventrals adherent to the belly; body scaly; teeth of the upper jaw movable, in a single series..... *Sicyopterus*.
 - aa. Ventrals not adherent to the belly; body scaly; teeth conical, fixed, those of the upper jaw in several series.
 - b. Soft dorsal and anal short, each composed of nine to twelve soft rays.
 - c. Tongue truncate or rounded or pointed at tip; gill-openings chiefly confined to the sides; pectorals without silk-like rays above; dorsal spines rather weak, some of them often elongate.
 - Rhinogobius*.
 - cc. Tongue emarginate at tip; gill-openings extending forward below; pectorals without silk-like rays above; scales rather large, about fifty..... *Glossogobius*.
 - bb. Soft dorsal and anal long, the former composed of fourteen to thirty rays, dorsal spines seven to nine.
 - c. Scales moderate; soft dorsal composed of fourteen or fifteen rays; cheeks scaly at least above; pectorals without free silk-like rays above..... *Acanthogobius*.

Genus ELEOTRIS (Gronow) Schneider.

- 1763. *Eleotris* GRONOW, Zoöphyl., p. 83 (non binomial).
- 1801. *Eleotris* SCHNEIDER, Syst. Ichth., p. 65. (Type *Gobius pisonis* Gmelin).
- 1874. *Culius* BLEEKER, Archiv. Neerl., IX, p. 303 (*Pœcia fusca* Schneider).

Body long and low, compressed behind. Head long, low, flattened above, without spines or crests, almost everywhere scaly. Mouth large, oblique, lower jaw projecting. Lower pharyngeals rather broad, the teeth small, bluntish. Pre-opercle with a small concealed spine below, its tip hooked forward. Branchiostegals unarmed. Tongue broad, rounded. Posttemporal bones very strongly divergent, their insertions close together; top of skull somewhat elevated and declivous; interorbital area slightly convex transversely; dorsal fins well apart,

¹¹ *Channa ocellata* Peters, Monatsb. Acad. Wiss. Berlin, 1864, p. 384, China.

the first composed of five or six low, flexible spines; ventrals separate. Scales moderate, ctenoid, forty-five to seventy in a longitudinal series; vertebrae (*pisonis*) 11-15. Tropical seas, entering fresh waters (Jordan & Snyder).

Distribution: Freshwater fishes of the tropics, some of the species entering the sea; cosmopolitan.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a. Scales of moderate size, about 50 in a lateral series, 15 between origins of the second dorsal and anal.....*oxycephala*.
 aa. Scales small, about 60 in a lateral series, 16 between origins of the second dorsal and anal.....*fusca*.

63. **Eleotris oxycephala** (Schlegel).

Doman (Lake Biwa, Japan); Onkoŕa (Formosa).

1845. *Eleotris oxycephala* SCHLEGEL, Fauna Japonica, Poiss., p. 150, Pl. LXXVII, Fig. 4, 5; Nagasaki.—GÜNTHER, Cat. Fish., III, 1861, p. 116; China.—KNER Novara, Fisch., II, 1865, p. 185; China.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXII, 1900, p. 371; Lake Biwa.—Proc. U. S. Nat. Mus., XXIV, 1901, p. 46; Haneda; Wakayama.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, No. 4, 1909, p. 200; Takao, Formosa.
 1846. *Eleotris canthrinus* RICHARDSON, Ichthyol. China, p. 209; Macao.
 1905. *Eleotris balia* JORDAN & SEALE, Proc. U. S. Nat. Mus., XXIX, p. 526; Hongkong.

Head 3.33 in length; depth 5; D. VI, 8; A. 9; P. 18; V. 5; depth of caudal peduncle 2.33 in head; eye 6; interorbital space 3; snout 4; fifty scales in a lateral series, fifteen scales between origins of second dorsal and anal.

Body deep, caudal peduncle strongly compressed; head long, much depressed, considerably broader than the body, a longitudinal groove along the median line of the top; snout rather short, broadly rounded anteriorly, interorbital space flat; mouth large, terminal, slightly oblique, its angle extending to a vertical through the anterior border of orbit; lips thick; lower jaw projecting beyond the upper; teeth on both jaws, simple, in rather broad bands, inner ones larger; palatines and vomers without teeth; eyes superior and anterior; tongue oblong, anterior edge rounded; nostrils separated, very small, anterior nostril in a short tube; gill-openings lateral, not extending very far forwards; posterior border of the pre-opercle with a hidden spine, which projects downward and forward; gill-rakers 3 + 9, short and covered with delicate setae.

Two pairs of dorsal fins; first dorsal rather small, when depressed reaching the insertion of the second dorsal, posterior ray of the latter longest; pectorals acutely rounded, reaching to the posterior end of the base of the first dorsal; ventrals separated, rather small; the anal inserted beneath the third soft ray, when depressed reaching so far as the end of second dorsal; caudal fin rounded; anal flap developed.

Head with minute scales except snout, chin, and throat; occiput and cheeks with small cycloid scales; body covered with uniform ctenoid scales, those on belly, breast, and nape are minute and cycloid.

Color in formalin uniformly dark brown, ventral parts whitish, densely speckled with minute brown spots; a wide black stripe, made up of small black dots, extending from opercle to caudal; a distinct narrow black line through eye from snout to origin of dark stripe on body; another short black line from posterior margin of orbit to posterior margin of pre-opercle; first dorsal with two brown bands which run horizontally; second dorsal and anal with numerous dark spots; caudal and pectorals with small brownish spots arranged in vertical rows.

Length of body 112 mm.

Described from a specimen from Tozen River, collected by T. Aoki in December, 1916.

Habitat: Tamsui River near Maruyama; Tozen River; Giran River near Inzanpo and Kiburan; Buroko River near Suwo.

MEASUREMENTS OF *Eleotris oxycephala*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Depth of Caudal Peduncle.	Interorbital.	Snout.	Eye.	Scales.	Length. Min.
Tozen River.....	3.33	5	VI, 8	9	18	5	2.33	3	4	6	50-15	112
Tamsui River.....	3.26	5.22	VI, 9	9	17	5	2.33	3.37	3.83	6.50	48-15	109
Tamsui River.....	3.35	4.81	VI, 9	9	18	5	2.13	3	3.66	7	50-16	120
Inzanpo.....	3.15	4.25	VI, 9	9	19	5	2.22	3.25	3.90	7	48-15	150
Kiburan.....	3.28	4.50	VI, 8	9	19	5	2.40	3.50	4	6	48-15	105
Kiburan.....	3	4	VI, 9	9	17	5	2.50	3.44	4	5.40	46-15	113
Kiburan.....	3.45	5.26	VI, 9	9	19	5	2.50	3.40	3.77	6.66	48-15	130
Kiburan.....	3	4.60	VI, 9	9	18	5	2.50	3.75	4	5.66	48-15	110
Giran.....	3.26	4.66	VI, 9	8	19	5	2.25	3	3.44	7	50-15	165

64. *Eleotris fusca* (Schneider).

1801. *Pæcia fusca* SCHNEIDER, Bloch. Syst., p. 453.

1861. *Eleotris fusca* GÜNTHER, Cat. Fish., III, p. 125; Ganges; Calcutta; Bengal; Amboyna; Aneitum; Oualan; Wanderer Bay; Ceylon; Canton.—ISHIKAWA,

- Prel. Cat. Fishes, 1897, p. 31; Riukiu Islands.—DAY, Proc. Zoöl. Soc. London, 1869, p. 519.—KNER, Novara Fisch., II, 1865, p. 186; Ceylon; Nicobar; Tahiti.—DAY, Fish. Brit. India, p. 313.—PETERS, Monatsb. König. Akad. Wiss. Berl., 1868, p. 268; Luzon; Samar.—BOULENGER, Ann. Mag. Nat. Hist. (6), XV, 1895, p. 186; Palawan.—JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXIV, 1902, p. 45; Honolulu.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 361; Suwata, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 200; Formosa.—Bull. U. S. Bur. Fish., XXVII, 1908, p. 274; Sibuyan; Apari.—Check-list Philip. Fish., 1910, p. 45.
1822. *Cheilodipterus culius* BUCHANAN-HAMILTON, Fish. Ganges, p. 55, Pl. V, Fig. 16; Ganges.
1824. *Eleotris nigra* QUOY & GAIMARD, Zoöl. Voy. Freycinet, p. 259, Pl. LX, Fig. 2; Guam, Waigiou.—CUV. & VAL., Hist. Nat. Poiss., XII, 1837, p. 235; Isle de France; Ganges; Malabar; India; Java; Otaiti; Borabora; Society Island; Madagascar.
1831. *Eleotris mauritianus* BENNETT, Proc. Comm. Zoöl. Soc., I, p. 166; Mauritius.

Head 3.39 in length; depth 5.33; depth of caudal peduncle 2 in head; eye 5; interorbital space 3.66; snout 4; maxillary 2.4; D. VI, 9; A. 9; P. 18; V. 1, 5; sixty-four scales in a lateral series, sixteen scales between origins of the second dorsal and anal.

Body rather depressed, posterior part compressed; head long, depressed, broader than body, a shallow longitudinal groove along the median line of the top; snout rather short, broadly rounded anteriorly, interorbital space more or less concave; mouth large, terminal, slightly oblique, its angle reaching a vertical through the anterior border of orbit; lips thick; lower jaw protruding; teeth in villiform bands, those on the outer series somewhat enlarged; palatines with no teeth; eyes superior and anterior; tongue oblong, with rounded anterior margin; nostrils separated, minute, the anterior located just behind the upper lip, the posterior approximated to eye above; gill-openings lateral, not extending very far forward; a spine at the angle of preoperculum, projecting downward and forward.

Dorsal fin separated; first dorsal rather small, when depressed scarcely reaching the root of second dorsal; second dorsal without filamentous rays, posterior ray the longest; pectoral fins acutely rounded, reaching beyond the posterior end of base of first dorsal; ventrals separated, rather short; the anal inserted beneath third dorsal ray, when depressed reaching end of second dorsal; caudal fin rounded; anal flap developed.

Body covered with minute ctenoid scales; scales on the upper surface of the head small and cycloid, extending forward to the inter-

orbital space; cheeks covered with minute scales; those on the belly minute and cycloid.

Color in formalin dark gray above; lower surface pale brown, with minute brown spots; pectorals and anal with a number of rows of faint brown spots; dorsal and caudal fins with several series of brown spots; ventral fins indistinctly spotted with dark.

Length of body 94 mm.

Described from a specimen from Buroko River near Suwo, collected by T. Aoki in August, 1917.

Habitat: Buroko River near Suwo (a single specimen).

Remarks: The head of the above-described specimen is a little longer than that of the specimen described by Günther or Day. But as the specimens of *Eleotris fusca* from Sumatra, which are contained in the Stanford collection have longer heads, there is no doubt with reference to the identity of the present species.

MEASUREMENTS OF *Eleotris fusca*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Depth of Caudal Peduncle.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Buroko River.....	3.39	5.33	VI, 9	9	18	1, 5	2	3.66	4	5	64-16	94
Sumatra (No. 8009; S. U.)...	3.37	4.71	VI, 9	9	18	1, 5	2.21	3.55	4	6	60-16	128
Sumatra (No. 8009; S. U.)...	3.43	5.39	VI, 9	9	18	1, 5	2.23	3.22	4	6.5	60-16	116

Genus BUTIS Bleeker.

1874. *Butis* BLEEKER, Arch. Neer. Sc. Nat., IX, p. 543. (Type *Cheilodipterus butis* Hamilton.)

Body elongate, posterior part compressed, somewhat cylindrical in front. Head elongate, strongly depressed, its upper surface gradually inclining anteriorly; snout produced; interorbital space provided with a pair of bony ridges along the superior margin of the orbit. Cheeks rather rough, sometimes with striæ. Teeth in many series, set close together, minute and subequal, those of the outer row somewhat larger; tongue and palate edentulous. Pre-operculum without a spine. Scales large, about thirty in a longitudinal series; scales on occiput extending to the interorbital space; cheek covered with scales.

Distribution: Philippine Islands; Malayan Archipelago; India to China; Formosa.

65. *Butis butis* (Hamilton).

1822. *Cheilodipterus butis* HAMILTON, Fish. Ganges, pp. 57, 367.
1849. *Eleotris butis* CANTOR, Catal. Malay. Fish., p. 196—Günther, Cat. Fish., III, 1861, p. 116; China; Philippine Islands; Borneo; Amboyna; Penang; India.—DAY, Fish. Brit. India, p. 315; Pl. LXVIII, Fig. 3; Seas and estuaries of India to the Malay Archipelago.—SAUVAGE, Bull. Soc. Philom., 1883, p. 8; Siam.
1861. *Butis butis* BLEEKER, Versl. Akad. Amst., XII, p. 77; Penang.—BOULENGER, Ann. Mag. Nat. Hist., Ser. 6, XV, p. 186; Palawan.—JORDAN & RICHARDSON, Bull. U. S. Bur. Fish., XXVII, 1908, p. 125; Manila; Hoilo.
1849. *Butis melanostigma* BLEEKER, Verh. Bat. Gen., XXII, p. 23; Madras Straits.—BLEEKER, Arch. Neerl. Sc. Nat., X, 1875, p. 68.
1905. *Butis leucurus* JORDAN & SEALE, Proc. U. S. Nat. Mus., XXVIII, p. 794, Fig. 13; Negros.—JORDAN & SEALE, Bull. U. S. Bur. Fish., XXVI, 1906; p. 40; Negros.—EVERMANN & SEALE; Bull. U. S. Bur. Fish., XXVI, 1906 (1907), p. 104; Bacon.

Head 3 in length; depth 4.33; depth of caudal peduncle 3 in head; eye 5; interorbital space 3.83; snout 2.5; D. VI, 9; A. 9; P. 20; V. I, 5; thirty scales in a lateral series, nine scales between origins of second dorsal and anal; gill-rakers 2 + 6.

Body elongate, compressed, deepest in front of the first dorsal; head long, flattened, its upper surface and cheeks covered with minute scales; pre-operculum with no spine; snout depressed and produced, tip slightly swollen, anterior margin rounded; interorbital space more or less flat, covered with minute scales; mouth large, oblique, its angle not reaching the vertical through anterior margin of orbit; lower jaw protruding; teeth in villiform bands; palatines and vomers with no teeth; eyes separated, superior, slightly nearer to tip of snout than end of operculum; nostrils separated, the anterior in a very short tube; a finely serrated ridge along the posterior and superior edge of the orbit, interspace between the ridge and orbit covered with two series of small scales.

Dorsal fin separated; spinous dorsal rather small, when depressed reaching to the origin of soft dorsal; height of soft dorsal rays subequal; pectorals lateral, middle ray elongate; ventrals separated, inserted in advance of the origin of pectoral; anal fin opposite the soft dorsal, inserted beneath the third ray, posterior rays longer; caudal fin rather short, squarish, tip rounded.

Body covered with large ctenoid scales, those on the head are minute and cycloid.

Color in alcohol uniformly dark gray, with lighter longitudinal

stripes along the sides; a deep brown spot on the lower half of the base of the pectoral; spinous dorsal nearly black; soft dorsal somewhat paler, with dark spots; caudal and anal fins dusky with darker spots; pectoral fins pale gray.

Length of body 93 mm.

Described from a specimen from Daitotei fish-market, Taihoku.

Habitat: Taihoku (a single specimen).

Genus *SICYOPTERUS* Gill.

1860. *Sicyopterus* GILL, Proc. Acad. Nat. Sci. Philad., p. 101. (Type *Sicydium stimpsoni* Gill.)

Body subcylindrical, covered with ctenoid scales of rather small size; head as broad as high; mouth nearly horizontal, with the upper jaw prominent; lips very thick and fleshy. The upper jaw with a series of numerous small teeth, implanted in the gum and movable; lower jaw with a series of conical, widely set teeth. Eyes of moderate size. Two dorsal fins, the anterior with six flexible spines, of which the third is filiform; caudal fin quite free; ventral fins united to a small semicircular disc, more or less adherent to belly. Gill-openings of moderate width; four branchiostegals; no air-bladder.

Distribution: Hawaii; Japan; Philippine Islands; Formosa.

66. *Sicyopterus japonicus* (Tanaka).

Bozuhaze (Japan); Fushunhii (Formosa).

1909. *Sicydium japonicum* TANAKA, Journ. Coll. Sci., Tokyo, XXVII, p. 22; Tosa, Japan.

1913. *Sicyopterus japonicus* JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci., XXXIII, p. 431; Tosa; Kii; Kinokawa.—TANAKA, Fishes of Japan, XI, p. 203; Kii; Hiuga.

Head 4.21 in length; depth 5.88; D. VI, 11; A. 10; P. 19; eye 6.5 in. head; interorbital space 2.66; snout 2.18; depth of caudal peduncle 1.71; fifty-nine scales in a lateral series; sixteen scales in a transverse series.

Body elongate, subcylindrical, slightly compressed; head rather large, round, its top slightly depressed; snout broadly rounded anteriorly; mouth horizontal, its angle reaching the vertical through anterior margin of orbit; upper jaw prominent; lips thick and fleshy, a series of numerous minute teeth in upper jaw, implanted in the gum and movable; lower jaw with a series of conical widely-set teeth; eyes small, superior, and in the middle of the head; nostrils widely separated, the anterior in a small round hole, the posterior slit-like and

minute; gill-openings lateral, in front of the base of the pectoral; gill-membranes broadly united to isthmus.

Two dorsal fins, the first dorsal inserted above the posterior half of pectoral, nearer to the origin of second dorsal than to the tip of snout, with six flexible spines, of which the third is filiform, reaching the anterior third of the base of second dorsal, fin-membrane united to the back behind the last spine; second dorsal opposite to the ventral, elongate, its rays subequal in height; pectoral fins lateral, leaf-shaped, with rather sharp tip, reaching midway between origin of ventral and that of the anal; ventrals united, forming a small semicircular disk, more or less adherent to the belly; origin of the anal slightly behind that of the second dorsal, similar in form to the latter; caudal fin rounded.

Body covered with ctenoid scales, those on the anterior parts of body and the base of caudal cycloid; head entirely naked; no lateral line.

Color in formalin brownish gray, paler below; dorsal surface with about ten black cross-bands, some of which extend downwards, first band in front of the base of pectoral, second one in front of the origin of first dorsal; head uniformly dark gray; all the fins dark gray; first dorsal sparingly spotted with dark, each ray of the second dorsal with a series of pale brown spots; proximal part of caudal fin darker.

Length of body 120 mm.

Described from a specimen from Tamusui River near Shinten, collected by T. Aoki in December, 1916.

Habitat: Tamusui River; Tozen River; Koranronsho, Taichu; Shinchiku; Bokusekikaku; Choso River (Koshiryo); Taiko.

MEASUREMENTS OF *Sicyopterus japonicus*.

Locality.	Head.	Depth.	D.	A.	P.	Interior- orbital.	Snout.	Eye.	Depth of Caudal Pedicule.	Scales.	Length, Mm.
Tamusui River.....	4.21	5.85	VI, 11	10	19	2.66	2.18	6.50	1.71	59-16	120
Tamusui River.....	4.13	6.33	VI, 11	10	18	2.44	2	6	1.64	58-16	116
Tamusui River.....	4.32	6.25	VI, 11	11	18	2.44	2	6.50	1.64	59-16	120
Tamusui River.....	4.32	6.33	VI, 11	11	19	2.40	2	6	1.64	60-16	115
Tozen River.....	4.38	5.88	VI, 11	11	19	2.75	2.10	7	1.62	58-16	113
Tozen River.....	4.40	5.65	VI, 11	11	19	2.50	2.27	6.66	1.47	58-16	140
Choso River.....	4.47	5.80	VI, 11	10	19	2.50	2.33	6	1.12	60-15	105
Heirinbi.....	4.78	4.42	VI, 11	10	19	2.40	2	6.75	1.69	59-16	112
Taiko.....	4.34	5.41	VI, 11	10	19	2.31	2.31	7	1.53	60-16	166

Genus RHINOBOBIUS Gill.

1859. *Rhinogobius* GILL, Proc. Ac. Nat. Sci. Philad., p. 145. (Type *Rhinogobius similis* Gill.)

Body oblong, compressed. Head oblong, not much compressed. Eyes high, anterior, close together; opercles unarmed. Mouth moderate, the lower jaw unusually short. Teeth on jaws only; conical, in few or several series, those in the outer row enlarged; no large canines; tongue usually truncate. Isthmus broad. Shoulder-girdle without fleshy flaps or papillæ. Skull depressed, abruptly widened behind the eyes and without distinct median keel. Scales moderate or large, ctenoid, permanently covering the body; cheeks naked; opercles naked, or scaled above only; belly generally scaly. Dorsal with six rather weak spines; pectoral well-developed, the upper rays without free or silk-like tips; ventrals completely united, not adnate to the belly; caudal fin usually obtuse. (Jordan & Snyder.)

Distribution: Philippine Islands; Formosa; China; Corea; Japan; North America.

SYNOPSIS OF THE FORMOSAN SPECIES.

I. Opercles entirely naked.

a. Nape with a naked area.

b. Dorsal spines filamentous.

c. Scales about thirty-six; head with many mucous pores. *taiwanus*.

bb. Dorsal spines not filamentous.

c. Scales thirty-six to thirty-eight; head without mucous pores.

candidius.

cc. Scales twenty-nine; head without mucous pores. . . . *formosanus*.

aa. Nape closely scaled.

b. Scales about twenty-nine; dorsal spines not filamentous; teeth in two series *giurinus*.

bb. Scales about twenty-eight; dorsal spines not filamentous, teeth in villiform band, lower jaw with two canine teeth on each side. *caninus*.

67. *Rhinogobius candidius* (Regan).

1908. *Ctenogobius candidius* Regan, Ann. Mag. Nat. Hist. (8), I, p. 153; Lake Candidius, Formosa.

Head 3.77 in length; depth 5.5; caudal peduncle 2.11 in head; eye 5; interorbital space 4.75; snout 2.71; D. VI, 9; A. 9; P. 20; thirty-six scales in a lateral series, ten scales between origins of the second dorsal and anal; gill-rakers 3 + 6.

Body robust, a little deeper than wide; caudal peduncle compressed; head slightly depressed; snout rather long and sharp; mouth terminal, a little oblique, its angle not reaching a vertical through the anterior

margin of orbit; jaws subequal; lips thick; teeth on both jaws in villiform bands, those on the outer series conical and somewhat larger; tongue broad, anterior border rounded; nostrils separated, the anterior in a short tube; eyes high, upper margin more or less projecting; interorbital space concave.

Dorsal fin separated, none of the spines elongated, when depressed not reaching the base of second dorsal, soft rays a little longer than the spines, rather high; pectorals large, not reaching the vent; ventrals united, forming a concave disk which is not adnates to the belly; anal fin inserted below the third dorsal ray, when depressed extending beyond the end of second dorsal, sixth and seventh rays the longest; caudal fin quadrate, tip rounded.

Head and nape entirely naked; scales in front of first dorsal as well as those on the breast and belly minute and cycloid, rest of the scales ctenoid.

Color in alcohol pale olive-gray, sides with seven brownish broad cross-bars; back mottled with dark; a black elongated spot on the base of the caudal; lower surface whitish; first dorsal dusky, second dorsal spotted with black; caudal fin dusky; other fins whitish.

Length of body 84 mm.

Described from a specimen from Bokusekikaku, collected by Yone-taro Kikuchi.

Habitat: Bokusekikaku; Heirinbi; Tozen River; Shinchiku; Daiko River; Taito River. Lake Candidius (Regan).

Remarks: The nearest relative of the present species is *Rhinogobius bedfordi* (Regan)¹² from Corea. It differs in having the second spine of the first dorsal produced into a filament.

MEASUREMENTS OF *Rhinogobius candidius*.

Locality.	Head.	Depth.	D.	A.	P.	Depth of Caudal Peduncle.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Bokusekikaku.....	3.77	5.50	VI, 9	9	20	2.11	4.75	2.71	5	36-10	84
Bokusekikaku.....	3.52	5.35	VI, 9	9	20	2	4.66	2.63	5.50	38-10	90
Heirinbi.....	3.63	6.22	VI, 9	9	19	2.66	5	2.42	4.66	37-9	70
Tozen River.....	3.58	5.25	VI, 9	9	16	2	5	2.42	4.50	35-10	72
Shinchiku.....	3.33	5.66	VI, 9	9	19	2.28	5	2.50	4	35-10	61
Daiko River.....	3.75	5.50	VI, 9	9	19	2.16	5	2.60	4	36-10	55
Daiko River.....	3.25	5.42	VI, 9	9	17	2.16	6	2.60	4.50	35-10	48
Daito River.....	3.62	5.33	VI, 9	9	18	2	4.66	2.75	4.50	35-10	57

¹² *Ctenogobius bedfordi* Regan, Proc. Zoöl. Soc. London, 1908, p. 62; Chong-ju, Corea.

68. *Rhinogobius giurinus* (Rutter).

1897. *Gobius giurinus* RUTTER, Proc. Acad. Nat. Sc. Philad., p. 86; Swatow, China.
 1901. *Gobius giurus* ABBOTT, Proc. U. S. Nat. Mus., XXIII, p. 491; Tiensin.
 1903. *Ctenogobius platycephalus* JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, p. 362; Taihoku.
 1909. *Rhinogobius giurinus* JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, p. 200; Kotosho; Taihoku, Formosa.

Head 3.47 in length; depth 4.33; depth of caudal peduncle 2.5 in head; eye 4; interorbital space 7.66, snout 2.5; D. VI, 9; A. 10; P. 19; twenty-nine scales in a lateral series, nine scales between origins of the second dorsal and anal.

Body elongate, a little deeper than wide, posterior part compressed; head broader than deep; snout rather long, sharp, anterior margin acutely rounded; interorbital space concave, narrow; mouth moderate, somewhat oblique, its angle scarcely reaching a vertical through anterior margin of orbit; lips thick; jaws subequal; teeth in two series, outer ones small, canine-like, second series in upper jaw minute, no large caniniform teeth; tongue broad, the tip truncate; eye high in head, upper margin projecting, situated midway between tip of snout and posterior edge of opercle; gill-openings not extending far forwards; gill-rakers 2 + 8 on first arch; no barbels on lower jaw.

Dorsal fin separated, rather short, spinous rays not filamentous, when depressed not reaching the second dorsal; soft rays a little longer than the spines; pectorals rounded, extending to the vent above; ventrals united, not adnate to the belly, the tips not reaching the vent; the anal inserted below second ray of second dorsal, when depressed extending as far posteriorly as the second dorsal; caudal fin rounded.

Head, except the occiput, naked; body covered with large, regular ctenoid scales; those on the occiput smooth and cycloid.

Color in formalin pale olive-gray above, lower parts whitish; head spotted with dark, cheek with oblique, rather wavy bars; sides with a number of irregular black spots; back mottled with dark; occiput with closely crowded dark blotches; dorsal fins with dusky spots arranged in longitudinal rows; caudal fin fuscous, with indistinct wavy cross-band near the base; pectoral fins dark; ventrals and anal whitish.

Length of body 65 mm.

Described from a specimen from Shimo-Tamusui River near Ako, collected by T. Aoki in December, 1916.

Habitat: Shimo-Tamusui River near Ako; Tozen River; Wodensho, Taichu; Daito River; Tamusui River; Shori, Toyen; Hyoko and Maruyama, Giran.

Remarks: In the year 1903, Jordan and Evermann described the present species from Kotoshō and Taihoku under the name *Ctenogobius platycephalus* (Richardson), though there were some doubts with reference to its identity. In Jordan and Richardson's paper, however, the name has been changed to *Rhinogobius giurinus* (Rutter).

The present species is very closely allied to *Rhinogobius hadropterus*¹³ from Japan. But it differs in having a greater number of scales in the lateral series.

MEASUREMENTS OF *Rhinogobius giurinus*.

Locality.	Head.	Depth.	D.	A.	P.	Depth of Caudal Peduncle.	Interorbital.	Snout.	Eye.	Scales.	Length. Min.
Shimo-Tamusui River.	3.47	4.33	VI, 9	10	19	2.50	7.66	2.50	4	29-9	65
Shimo-Tamusui River.	3.25	5.17	VI, 10	10	20	3	7.66	2.71	4.33	29-9	78
Shimo-Tamusui River.	3.28	5.70	VI, 9	9	20	2.83	6	2.71	4	30-9	74
Tamusui River.	3.47	6	VI, 9	9	20	2.83	6.66	2.63	4.25	30-8	73
Shori.	3.47	5	VI, 9	9	20	2.80	7.50	2.50	4.66	30-8	60
Shori.	3.48	5.36	VI, 10	10	19	2.63	7	2.50	4.60	29-8	89
Daito River.	3	5.66	VI, 9	9	19	3.14	7.50	2.55	5	31-8	83
Wodensho.	3.33	5.10	VI, 9	9	20	2.66	6.66	2.80	4.25	29-8	63
Tozen River.	3.22	5.21	VI, 9	9	19	2.75	6.50	2.44	5.40	30-9	90
Heirinbi.	3.40	5.75	VI, 10	10	19	2.71	5.66	2.50	4.66	30-8	82
Hyoko.	3	5.66	VI, 9	9	19	3	5	3	4	30-8	50
Maruyama.	3.33	5	VI, 9	9	19	2.33	5	2.50	4	30-9	59
Swatow (Type).	3.58	6	VI, 9	9	20	2.57	7.33	2.57	4	30-9	73

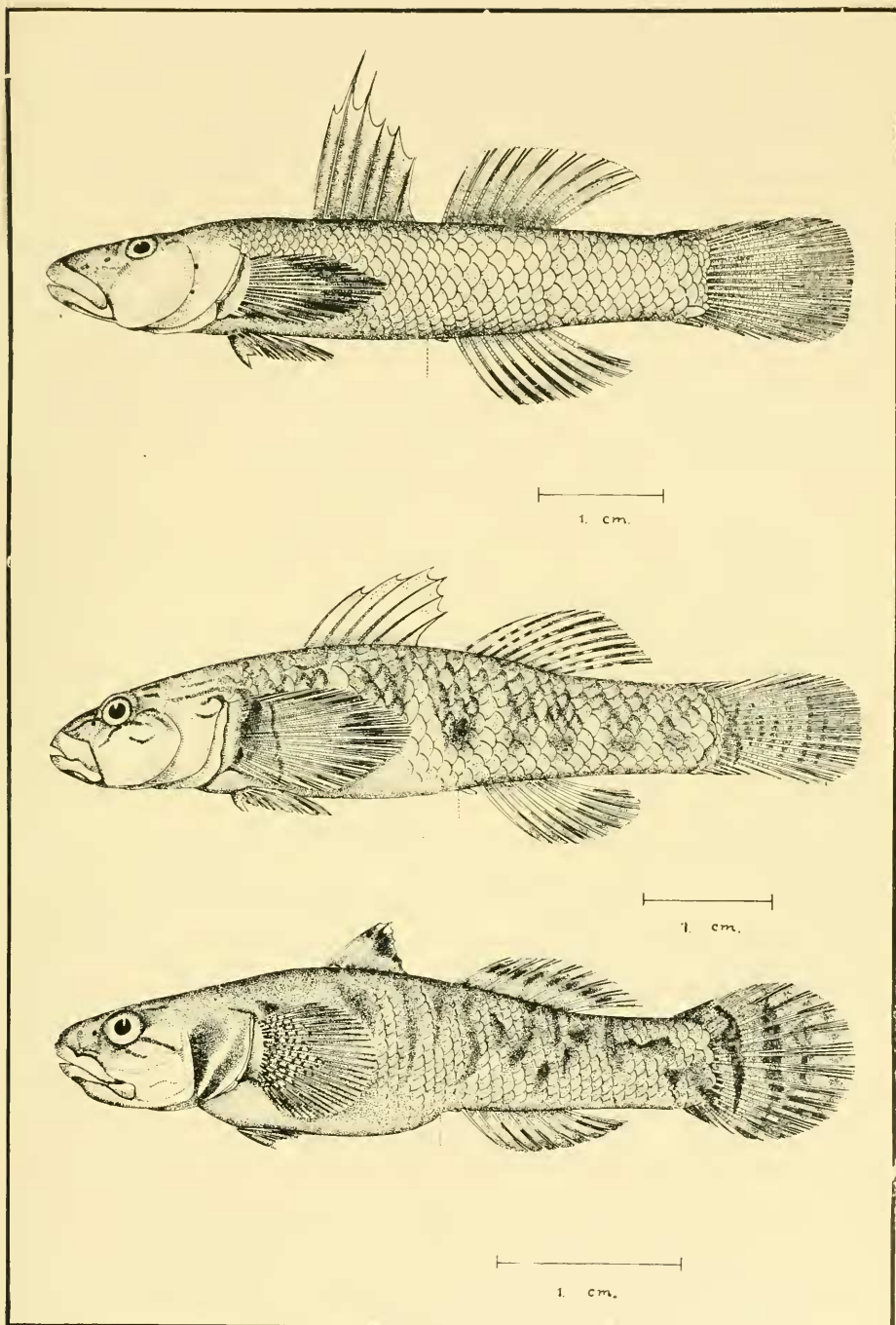
69. *Rhinogobius taiwanus* sp. nov. (Plate LIII, Fig. 1.)

Head 3.35 in length; depth 5.6; depth of caudal peduncle 2.25 in head; eye 5; interorbital space 7; snout 2.38; D. VI, 9; A. 9; P. 17; V. 1, 5; thirty-six scales in a lateral series, twelve scales in a transverse series between origin of second dorsal and anal; gill-rakers 2 + 7.

Head and body of nearly the same depth throughout, caudal peduncle slightly low and compressed; head long and depressed, its width contained 1.64 in its length, cheeks slightly bulged out; snout rather long, sharply pointed anteriorly; mouth terminal, slightly oblique, its angle not reaching to a vertical through the anterior margin of orbit;

¹³ *Ctenogobius hadropterus* Jordan & Snyder, Proc. U. S. Nat. Mus., 1901, XXIV, p. 60; Nagasaki; Kurume; Tsuruga; Kawatana.

Rhinogobius hadropterus, Jordan, Snyder, & Tanaka, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 343.



Rhinogobius taiwanus Oshima, sp. nov.

Rhinogobius formosanus Oshima, sp. nov.

Glossogobius parvus Oshima, sp. nov.

upper jaw more or less projecting; lips fleshy; teeth on both jaws in villiform bands, those on outer row enlarged; eyes superior, situated midway between tip of snout and posterior angle of opercles; interorbital space concave and narrow; anterior nostril in a short tube.

Dorsal fins well separated; spinous dorsal greatly elevated, second spine the longest, filamentous, its height 3.8 in total length without caudal, the third a little shorter than the second, the last spine about one-third as long as the second; soft dorsal high, posterior ray the longest, when depressed scarcely reaching the root of caudal; pectorals extending beyond the posterior end of base of spinous dorsal; ventrals united, forming a round, concave cup, the tip of which reaches middle of pectoral, free from the belly; anal fin inserted below second ray of soft dorsal, posterior ray the longest, when depressed reaching end of soft dorsal; caudal fin rounded.

Body covered with large ctenoid scales; small cycloid scales near the base of spinous dorsal and on the belly; head and occiput entirely naked.

Head with a number of mucous pores nearly as large as the nostril, one on each side above and before the eyes, one on the posterior part of

MEASUREMENTS OF *Rhinogobius taiwanus*.

Locality.	Head.	Depth.	D.	A.	P.	Depth of Caudal Peduncle.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Shinchiku.....	3.35	5.40	VI, 9	9	17	2.25	7	2.38	5	36-12	69
Shinchiku.....	3.21	5.44	VI, 9	8	17	2.33	7	2.66	5	36-11	55
Shinchiku.....	3.20	6.25	VI, 9	9	16	2.42	7	2.42	4.50	35-10	59
Shinten.....	3.14	6.27	VI, 9	9	18	2.63	7	2.33	4.60	36-10	80
Sobun River.....	3.19	6	VI, 9	9	18	2.42	6	2.66	5	35-10	64
Jitsugetsutan.....	3.35	5.23	VI, 9	10	18	2.10	6	2.25	5	36-12	81
Dakusui River.....	3.19	6	VI, 10	9	18	2.14	6	2.42	5	36-11	60
Dakusui River.....	3.18	6.09	VI, 10	9	18	2.40	6	2.50	5	36-11	44
Dainansho.....	3.47	5.20	VI, 10	9	18	2.14	6.5	2.50	5	35-12	61
Bokusekikaku.....	3.17	5.80	VI, 9	8	18	2.57	5	2.50	5	37-10	70
Inzanpo.....	3.31	5.88	VI, 9	8	18	2.66	7	2.33	4.50	37-10	65

interorbital space, one behind each eye, two along the posterior edge of pre-operculum.

Color in alcohol pale brown, somewhat darker anteriorly; all the fins pale brown, soft dorsal and anal bordered with white.

Length of body 69 mm.

Described from a specimen from Shinchiku, collected by T. Aoki in December, 1916.

Habitat: Shincbiku; Tamsui River near Shinten; Dakusui River; Sobun River; Jitsugetsutan (Lake Candidius); Dainansho, Nanto; Bokusekikaku; Inzanpo, Giran.

Remarks: This species is near *Rhinogobius similis*¹⁴ from Japan, but differs distinctly in the smaller number of mucous pores and in the greater number of scales in the lateral series.

Rhinogobius candidius is another closely related species. It differs, however, in having no mucous pores and the spines of the first dorsal which are not filamentous.

70. *Rhinogobius formosanus* sp. nov. (Plate LIII, Fig. 2).

Head 3.53 in length; depth 4.25; depth of caudal peduncle 2 in head; eye 5; interorbital space 5.5; snout 2.8; D. VI, 9; A. 9; P. 19; twenty-nine scales in lateral series, nine scales in an oblique series between origins of second dorsal and anal.

Body rather robust, highest in front of first dorsal; tail slightly compressed; head elongate, entirely naked; snout pointed anteriorly; mouth moderate, more or less oblique, its angle reaching a vertical through anterior margin of orbit; jaws subequal; lips fleshy, upper lip rather wide; tongue broad, with rounded tip; teeth on the upper jaw in a single series, conical and minute, those on the lower jaw in a narrow villiform band, outer ones pointed and in a single row; eyes high in head, upper margin projecting above the contour of head, situated nearer to tip of snout than the posterior edge of opercle; interorbital space convex; nostrils separated, anterior nostril in a short tube.

Dorsal fins well separated, none of the spines elongated, when depressed not reaching the base of second dorsal; second dorsal rather short, middle ray longest; pectorals rhomboidal, pointed at the tip, not reaching the vent; ventrals united, forming a concave disk, not adnate to the belly; anal fin inserted below the third ray of second dorsal, when depressed extending to end of second dorsal, posterior ray longest; caudal fin rounded.

Body covered with large ctenoid scales, those on the belly smaller and cycloid; cheeks, operculum, and tip of head entirely naked.

Color in alcohol pale olive-gray, back mottled with dark; sides with about seven squarish dark cross-bars; lower surface whitish; top of

¹⁴ *Rhinogobius similis* Gill, Proc. Ac. Nat. Sci., Philad., 1859, p. 145; near Shimoda, Japan.

head, cheeks, and snout with a number of wavy, pale-brown, longitudinal streaks; membrane of the dorsal fins grayish, spines fuscous, soft rays spotted with dark; ventral fin whitish; pectoral and anal dusky, the latter bordered with white; caudal fin with wavy vertical cross-bands.

Length of body 65 mm.

Described from a specimen from Shinchiku, collected by T. Aoki in December, 1916.

Habitat: Shinchiku (a single specimen).

Remarks: The present species much resemble *Rhinogobius hadropterus*¹⁵ from Japan. It differs, however, in having an entirely naked head.

71. *Rhinogobius caninus* (Cuv. & Val.).

1837. *Gobius caninus* CUV. & VAL., Hist. Nat. Poiss., XII, p. 86.—BLEEKER, Verh. Batav. Gen., XXII, 1849, p. 27.—GÜNTHER, Cat. Fish., III, 1861, p. 38; China; East Indian Archipelago.

1905. *Rhinogobius caninus* JORDAN & SEALE, Proc. U. S. Nat. Mus., XXVIII, p. 796; Negros.—JORDAN & RICHARDSON, Bull. U. S. Bur. Fish., XXVII, 1908, p. 259; Iloilo; Lubang.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 200; Takao, Formosa.

1912. *Ctenogobius caninus* SNYDER, Proc. U. S. Nat. Mus., LXII, p. 514; Okinawa.

Head 3.45 in length; depth 5.42; caudal peduncle 2.44 in head; eye 4.8; interorbital space 8; snout 3.28; D. VI, 1, 9; A. 9; P. 19; twenty-eight scales in a lateral series, ten scales between the origin of soft dorsal and that of the anal.

Body oblong, compressed, depth nearly subequal throughout the body, gradually tapering posteriorly; head rather high, not depressed; snout rounded anteriorly, its profile slightly arched, interorbital space narrow; mouth oblique, its angle reaching beyond a vertical through anterior margin of orbit; lower jaw longer than the upper, with two large canine teeth on each side; teeth on both jaws in a villiform band, outer ones larger; tongue rather short, truncated in front; eyes high in head, much nearer tip of snout than the end of opercle; nostrils separated, in front of eye, the posterior slightly larger than the anterior.

Dorsal fins well separated, none of the spines elongated, when

¹⁵ *Ctenogobius hadropterus* Jordan & Snyder, Proc. U. S. Nat. Mus., XXIV, 1901, p. 60.

Rhinogobius hadropterus Jordan, Snyder, & Tanaka, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 343.

depressed scarcely reaching the origin of soft dorsal; soft dorsal rather long, armed with a short, slender undivided ray, posterior ray the longest, when depressed reaching root of caudal; pectorals quadrate, reaching a vertical through the vent; ventrals united, forming a shallow concave disc, not adnate to the belly; anal fin inserted below the third dorsal ray, posterior ray the longest, when depressed reaching the end of soft dorsal; caudal fin obtusely rounded.

Body covered with large ctenoid scales, those on the belly and occiput small and cycloid; cheek naked; occiput covered with minute scales.

Color in alcohol pale yellowish brown, sides with large irregular brown spots disposed in two longitudinal series; a dark round spot above the base of pectorals; head with no markings; spinous dorsal and pectorals dusky; membrane of the soft dorsal with longitudinal series of dark spots; outer margin of the anal black; caudal fin uniformly dusky.

Length of body 100 mm.

Described from a specimen from Takao, collected by Hans Sauter (Stanford Collections, No. 20995).

Habitat: Takao.

Genus GLOSSOGOBIUS Gill.

Body rather elongate, tail slightly compressed; head broad and depressed anteriorly, naked; interorbital space flat. Mouth very large, terminal and oblique; teeth moderate, in broad bands, the inner teeth depressible; tongue emarginate at tip. Sides of head naked; no barbels; eyes well separated; isthmus very narrow; the gill-openings ending forward below; pseudobranchiæ well-developed; no fleshy flaps on shoulder-girdle. Dorsal fins both short, the first composed of six slender spines; pectorals without silk-like rays above; ventrals united, not adnate to the belly; anal with nine soft rays; caudal free from the dorsal and anal. Body covered with rather large scales, which number about forty in the lateral series.

Distribution: Formosa; Philippine Islands; China; Japan; Malay Archipelago; Ceylon.

SYNOPSIS OF THE FORMOSAN SPECIES.

- a.* Dorsal fin VI, 10; anal composed of 9 rays; scales 31-32 in a lateral series, 9-10 in an oblique series between origins of the soft dorsal and anal. *brunneus*.
- aa.* Dorsal fin VI, 11; anal composed of 11 rays; scales 54 in a lateral series, 13-14 in an oblique series between origins of the soft dorsal and anal. *grammepomus*.

- aaa. Dorsal fin VI, 9; anal composed of 9 rays; scales 41 in a lateral series, 13 in an oblique series between origins of the soft dorsal and anal. *parvus*.
 aaaa. Dorsal fin VI, 10; anal composed of 10 rays; scales 28-30 in a lateral series. *abacopus*.

72. *Glossogobius brunneus* (Schlegel).

Urohaze (Japan); Kaugam (Giran, Formosa).

1847. *Gobius brunneus* SCHLEGEL, Fauna Japonica, Poiss., p. 142, Pl. LXIV, Fig. 2; Nagasaki.—GÜNTHER, Cat. Fish., III, 1861, p. 65; after Schlegel.—ISHIKAWA, Cat. Fish., 1897, p. 39; Tokyo; Boshu.
 1847. *Gobius olivaceus* SCHLEGEL, Fauna Japonica, Poiss., p. 143, Pl. LXXIV, Fig. 3; Nagasaki.
 1901. *Glossogobius brunneus* JORDAN & SNYDER, Proc. U. S. Nat. Mus., XXV, p. 74; Wakanoura; Onomichi; Hakodate; Kurume; Nagasaki.—JORDAN & EVERMANN, Proc. U. S. Nat. Mus., XXV, 1903, p. 361; Kotosho; Keelung, Formosa.—JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, 1909, p. 200; after Jordan & Evermann.—JORDAN, SNYDER, & TANAKA, Journ. Coll. Sci. Tokyo, XXXIII, 1913, p. 350; Hakodate to Nagasaki.
 1846. *Gobius platycephalus* RICHARDSON, Ichthyol. China, p. 204; Macao.
 1846. *Gobius fasciato-punctatus* RICHARDSON, Ichthyol. China, p. 204; Canton.
 1897. *Gobius giurus* RUTTER, Proc. Acad. Sci. Philad., Jan., p. 85; Swatow.

Head 3.16 in length; depth 4.88; depth of caudal peduncle 2.84; D. VI, 10; A. 9; P. 20; V. 1, 5; eye 5.71 in head, interorbital space 6.83; snout 3; maxillary 2.44; thirty-one scales in a lateral series, ten scales in a transverse series; gill-rakers 3 + 10.

Body robust, elongate, posterior part slightly compressed, highest near the insertion of spinous dorsal; head very large, depressed, broader than body, with a deep longitudinal groove on the top; snout more or less pointed, interorbital space rather flat; eyes supralateral, diameter nearly as long as the interorbital space; mouth large, terminal and oblique, its angle extending to a vertical through anterior third of the orbit; lower jaw protruding beyond the upper; lips broad; teeth simple, in two series, inner one depressible and somewhat larger; tongue broad, deeply notched at the tip; gill-openings lateral, running far forward below; width of isthmus nearly equal to the interorbital space; gill-rakers on the first arch short, reduced to mere elevations near the end of arch; nostrils separated, the anterior in a short tube; chin smooth.

Body covered with large ctenoid scales; head naked; no lateral line.

Dorsal fins separated; anterior dorsal inserted behind the base of the pectoral, second spine the longest, when depressed, reaching beyond the origin of second dorsal; fin-rays of second dorsal subequal in

height, a little shorter than first dorsal; pectoral fins lateral, large, rounded; ventrals united, forming an oval disc, not adnate to belly; anal inserted below third dorsal ray, posterior rays longer, reaching as far backward as do those of the dorsal, both not reaching the root of caudal; caudal fin rounded.

Color in formalin dark gray above, lower parts white; upper parts of sides mottled with black; dorsal fins grayish, with small dusky spots in more or less definite longitudinal series; pectorals and caudal with vertical rows of small dark spots; ventral fins whitish; the anal dusky.

Length of body 145 mm.

Described from a specimen from Taihoku, collected by T. Aoki in September, 1916.

Habitat: Taihoku; Tamusui River; Ritakukan, Giran.

MEASUREMENTS OF *Glossogobius brunneus*.

Locality.	Head.	Depth.	Depth of Caudal Peduncle.	D.	A.	P.	V.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Taihoku.....	3.16	4.88	2.85	VI, 10	9	20	1, 5	6.83	3	5.71	31-10	145
Taihoku.....	3.07	5.34	3	VI, 10	9	20	1, 5	7	3.25	6.33	32-10	150
Taihoku.....	3.21	5.89	2.91	VI, 10	9	20	1, 5	6.60	3.09	5.60	32-10	132
Taihoku.....	3	5.15	3	VI, 10	9	20	1, 5	7	3	5.66	32-9	127
Ritakukan.....	3.18	5.15	2.73	VI, 10	9	20	1, 5	6.25	3	6.33	32-9	173
Ritakukan.....	3.25	5.60	2.87	VI, 10	9	20	1, 5	6	3	6.18	32-9	180
Ritakukan.....	3.42	5.76	2.73	VI, 10	9	20	1, 5	6.66	2.93	6.33	32-9	177

73. *Glossogobius grammepomus* (Bleeker).

1849. *Gobius grammepomus* BLEEKER, Verh. Batav. Gen., XXII, p. 34.—GÜNTHER, Cat. Fish., III, 1861, p. 64; Malay Archipelago.

1849. *Gobius melanocephalus* BLEEKER, Verh. Batav. Gen., XXII, p. 34.—Naturk. Tydschr. Nederl. Ind., 1851, I, Fig. 4.—DAY, Fish. Brit. India, p. 292, Pl. LXIII, Fig. 6; Seas of India to Malay Archipelago.

1861. *Gobius littoralis* STEINDACHNER, Sitzsb. Wien, Acad., XLII, p. 289, Figs. 4, 5; Philippine Islands.

Head 3.17 in length; depth 4.5; D. VI, 11; A. 11; P. 17; V. 1, 5; width of head 1.42; eye 5.5 in head; interorbital space 4.42; snout 2.39; maxillary 2; depth of caudal peduncle 2.58; fifty four scales in a lateral series, fourteen scales between origin of second dorsal and that of the anal; gill-rakers 2 + 4.

Body thick, dorsal profile arcuate, ventral profile nearly straight, deepest in front of the spinous dorsal, tail compressed; head very large, broader than the body; cheek more or less bulged out; snout

rather long, broadly rounded anteriorly; eyes moderate, superior, but directed laterally; interorbital space broad, more or less concave; mouth slightly oblique, with very thick lips, its angle reaching a vertical through center of the orbit; upper jaw a little longer than the lower; teeth in a broad villiform band, no canine teeth, those in outer row somewhat larger; tongue broad, deeply notched in front; gill-openings run forward below; inner edge of shoulder-girdle without papillæ; gill-rakers very short; nostrils separated, the anterior in a short tube.

Head naked, except the occiput; body covered with large ctenoid scales, those on the nape and belly small and cycloid.

Dorsal fins separated; spines not filamentous, third spine longest, contained 1.82 in head, soft rays a little shorter than the spines, anterior longest; pectorals large, reaching the posterior end of the base of spinous dorsal; ventrals united, free from belly; anal flap well developed; anal fin inserted below second dorsal ray, when depressed reaching to the root of caudal; caudal fin rounded.

Color in formalin dark brown above, paler below, sides and upper part of the body with a number of vermiculated black spots; membranes of the dorsal fins dusky, spines and rays with a series of dark spots; caudal fin with a number of vertical cross-bars; the rest of the fin grayish.

Length of the body 118 mm.

Described from a specimen from Inzampo, Giran, collected by T. Aoki in August, 1917.

Habitat: Inzampo, Giran (two specimens).

MEASUREMENTS OF *Glossogobius grammepomus*.

Locality.	Head.	Depth.	D.	A.	P.	V.	Width of Head.	Interorbital.	Snout.	Eye.	Scales.	Length, Mm.
Inzampo.....	3.17	4.50	VI, 11	11	17	1, 5	1.42	4.42	2.39	5.5	54-14	118
Inzampo.....	3.39	4.75	VI, 11	11	17	1, 5	1.44	5	2.40	5.5	54-13	97

74. *Glossogobius parvus* sp. nov. (Plate LIII, Fig. 3).

Head 3.18 in length; depth 4; D. VI, 9; A. 9; P. 16; V. 1, 5; width of head 1.5 in its length; eye 4 in head; snout 3; interorbital space 2.5; depth of caudal peduncle 2.25; maxillary 2.2; scales about forty-one in a lateral series, thirteen scales between origins of the soft dorsal and anal; pectoral 1.5 in head; ventral 2.

Body rather slender, laterally compressed; head more or less depressed, broader than body, cheek fleshy, somewhat bulged out laterally; snout flat, broadly rounded anteriorly, interorbital space rather flat; eyes superior, directed laterally; mouth oblique, its angle reaching a vertical through centre of orbit; lips fleshy; upper jaw slightly longer than the lower; teeth in villiform bands, no caniniform teeth; tongue quadrate, emarginate at the tip; nostrils widely separated, the anterior in a short tube, just behind the upper lip; gill-openings extending downward and a little forward; gill-rakers very short.

Dorsal fin separated; spinous dorsal rather small, triangular, the anterior spine longest, no filamentous spines, when depressed not reaching the origin of soft dorsal; soft dorsal rather low, the posterior ray longest, its height contained twice in the length of head; pectorals rounded, reaching beyond the middle of base of spinous dorsal; ventrals united, not adnate to the belly, cup round and deep; anal flap well developed, elongate; the anal inserted below the second ray of soft dorsal, as high as the soft dorsal; caudal fin rounded.

Body covered with thin minute ctenoid scales; head, except occiput, naked; scales on the occiput and belly minute and cycloid; base of the pectoral fleshy and scaly.

Color in formalin brownish gray, sides with a number of irregular dark cross-bars; cheek with two longitudinal brown stripes originating at the orbit; dorsal fins brownish gray; tip of the spinous dorsal black, interspace between each ray with a black streak; caudal fin dusky, with three dark cross-bars; the rest of the fins uniformly dusky.

Length of body 44 mm.

Described from a specimen from Kizanto, Giran, collected by T. Aoki in August, 1917.

Habitat: Kizanto, Giran (a single specimen).

Remarks: Kizanto is a small island near Giran; the present species is probably a marine fish.

75. *Glossogobius abacopus* Jordan & Richardson.

1909. *Glossogobius abacopus* JORDAN & RICHARDSON, Mem. Carneg. Mus., IV, no. 4, p. 200; Takao, Formosa.

Head to tip of lower jaw three times in length; depth 5.5; eye 4 in head; dorsal VI, 10; anal 10; scales 28-30; snout 3.4 in head; maxillary 2.4; interorbital space slightly greater than width of pupil. Body elongate, rather depressed in front, tapering gradually backward to

the depressed caudal peduncle; depth of caudal peduncle 3.4 in head; head pointed; lower jaw projecting width of pupil; mouth large, maxillary reaching vertical from back of pupil; jaws, vomers and palatines with rows of fine, sharp-pointed teeth; tongue deeply notched; origin of spinous dorsal nearly an eye-length behind insertion of ventrals, its base 2.4 in head; base of soft dorsal 1.5 in head; longest dorsal spine 2.25; longest ray twice in head; origin of anal under second ray of soft dorsal, equidistant between base of caudal and back of eye; pectoral 1.3 in head; ventrals 1.4; depth of membranous cup of united ventrals two-thirds of length of eye; caudal 1.3 in head, rounded; a large anal papilla with notch behind.

Color in spirits brownish-olive, back and caudal peduncle crossed obliquely by four broad saddle-like bands of dark color; membranes of dorsals and of anal chiefly blackish, with some small spot-like intervals of paler on these and on rays; caudal and ventrals barred or checkered with dark; pectorals lightly speckled with dusky, with darker and denser specks below at base; under parts unevenly punctulated, the dots forming indistinct bars on chin and lower jaws; tip of lower jaw blackish.

This species is near *Glossogobius vaisiganis* from Samoa, but differs in the details of coloration, notably in the sharply checkered ventral fin. (Jordan & Richardson).

Habitat: Takao. (Jordan & Richardson). Not seen.

Genus ACANTHOGOBIUS Gill.

1859. *Acanthogobius* GILL, Proc. Ac. Nat. Sci. Philad., p. 145. (Type *Gobius flavimanus* Temminck & Schlegel.)
 1863. *Synechogobius* GILL, Proc. Ac. Nat. Sci. Philad., p. 266. (Type *Gobius hasta* Temminck & Schlegel.)

Body oblong, little compressed, covered with medium-sized roughish scales; cheeks with small scales; snout rather long, the head rounded in profile; mouth moderate, oblique, the jaws about equal, the teeth moderate; tongue truncate or very slightly notched; isthmus rather broad, the gill-openings slightly continued forward below; no flaps on shoulder-girdle. Dorsal fins rather long, the first composed of seven to nine slender spines, the second of fourteen or fifteen soft rays; anal of twelve to thirteen rays. (Jordan & Snyder).

76. *Acanthogobius ommaturus* (Richardson).

1846. *Gobius ommaturus* RICHARDSON, Voy. Sulph. Fish., p. 146, Pl. LV, Figs. 1-4; Woosung, Yang-tze-kiang.—GÜNTHER, Cat. Fish., III, 1861, p. 77; Amoy.—RUTTER, Proc. Nat. Sc. Philad., Jan., 1897, p. 85; Swatow.

1905. *Acanthogobius ommaturus* JORDAN & SEALE, PROC. U. S. Nat. Mus., XXIV, p. 528; Shanghai.

Head 3.56 in length; depth 7.5; D. IX, 18; A. 15; P. 21; V. 1, 4; width of head 1.81; eye 5.33 in head; interorbital space 7.5; snout 2.75; depth of caudal peduncle 3.75; seventy scales in a longitudinal series, eighteen scales between origins of second dorsal and anal; gill-rakers 3 + 8.

Body elongate, slender, anterior part somewhat cylindrical, tail compressed; head large, slightly depressed, its top scaly, cheek covered with minute scales; snout somewhat produced, acutely rounded anteriorly, tip slightly swollen; mouth large, inferior, its angle not reaching a vertical through anterior border of orbit; lips thick and fleshy; upper jaw slightly longer than the lower; teeth conical and fixed, in several rows, those of the outer series somewhat larger; eyes high up, interorbital space concave; nostrils separated; tongue broad, truncated in front; gill-openings not extending far forward; isthmus rather broad.

Dorsal fin separated; spinous dorsal slender, anterior spine longest, when depressed not reaching second dorsal; soft dorsal elongate, with many rays, length of each ray subequal; pectorals rather large, without free silk-like rays above, their bases smooth and muscular; ventrals completely united, forming a concave round disk which is not adnate to belly; anal inserted below fourth dorsal ray, when depressed reaching posteriorly as far as the dorsal, both not extending to the root of caudal; caudal fin rhomboidal, pointed at middle; caudal peduncle elongate.

Body covered with thin ctenoid scales; scales on head small and cycloid.

Color in alcohol pale gray above, lower half of the sides and belly whitish; rays of the dorsal fins spotted with black, caudal fin yellowish olive, with a number of dark markings near the base; the rest of the fins whitish.

Length of body 140 mm.

Described from a specimen from Taihoku, collected by T. Aoki.

Habitat: Taihoku (two specimens).

SUMMARY.

Family SALMONIDÆ.

I. PLECOGLOSSUS Temminck & Schlegel.

1. *altivelis* Temminck & Schlegel; Tamusui River.

Family SALANGIDÆ.

2. PARASALANX Regan.

2. *acuticeps* (Regan); not seen.
3. *ariakensis* (Kishinouye); Tamusui River.

Family SILURIDÆ.

3. PARASILURUS Bleeker.

4. *asotus* (Linnæus); Jitsugetsutan; Tamusui River; Inzampo; Ritakukan.
4. PSEUDOBAGRUS Bleeker.
5. *brevianalis* (Regan); Jitsugetsutan; Dainansho.
6. *taiwanensis* Oshima; Tozen River; Daito River; Shinchiku.
7. *adiposalis* Oshima; Tamusui River; Daito River; Sobun River.

5. LIOBAGRUS Hilgendorf.

8. *nantoënsis* Oshima; Dainansho.
9. *formosanus* Regan; not seen.

6. CLARIAS Gronovius.

10. *fuscus* (Lacépède); Jitsugetsutan; Taihoku; Tamusui River; Maruyama, Giran.

Family COBITIDÆ.

7. MISGURNUS Lacépède.

11. *anguillicaudatus* (Cantor); Tamusui River; Maruyama; Giran; Rato; Raupi; Jitsugetsutan.
12. *decemcirrosus* (Basilewsky); Taihoku; Taichu.

8. COBITIS Linnæus.

13. *tania* Linnæus; Shinchiku; Jitsugetsutan; Rigyokutsu; Maruyama, Giran.

Family HOMALOPTERIDÆ.

9. FORMOSANIA Oshima.

14. *gilberti* Oshima; Tamusui River.

10. HEMIMYZON Regan.

15. *formosanus* (Boulenger); Taiko River.

Family CYPRINIDÆ.

1. CARASSIUS Nilsson.

16. *auratus* (Linnæus); Taihoku; Giran.

12. CYPRINUS (Artedi) Linnæus.

17. *carpio* Linnæus; Taihoku; Temsonpi; Inzampo; Maruyama.

13. LABEO Cuvier.

18. *jordani* Oshima; Shori.

14. ACROSSOCHEILUS Oshima.

19. *formosanus* (Regan) Tamasui River; Tozen Rivor; Shinchiku; Horisha; Jitsugetsutan.

15. SCAPHESTHES Oshima.

20. *tamusuiensis* Oshima; Tamasui River; Choso River; Giran River.

16. HEMIBARBUS Bleeker.

21. *labeo* (Pallas); Tamasui River; Rigyokutsu.

17. BARBODES Bleeker.

22. *paradoxus* (Günther); Taiko River.

18. CAPOETA Cuvier & Valenciennes.

23. *semifasciolata* (Günther); Ako.

19. PUNTIUS Hamilton.

24. *snyderi* Oshima; Rigyokutsu; Maruyama; Daito River.20. *Spinibarbus* Oshima.25. *hollandi* Oshima; Sobun River.

21. GNATHOPOGON Bleeker.

26. *ijimæ* Oshima; Tozon River..

22. PSEUDOGOPIO Bleeker.

27. *brevirostris* Günther; Tamasui River.

23. PSEUDORASBORA Bleeker.

28. *parva* (Schlegel); Tamasui River; Taihoku; Raupi; Tozon River; Nanto; Rigyokutsu; Shinchiku; Ako; Shori; Bokusekikaku.

24. PARARASBORA Regan.

29. *moltrechti* Regan; Jitsugetsutan.

25. PIIOXISCUS Oshima.

30. *kikuchii* Oshima; Bokusekikaku.

26. *DISTÆCHODON* Peters.

31. *tumirostris* Peters; Taihasho, Giran.

27. *ISCHIKAUIA* Jordan & Snyder.

32. *macrolepis* Regan; not seen.

28. *CTENOPHARYNGODON* Steindachner.

33. *idellus* (Cuvier & Valenciennes); Shori.

29. *ACHEILOGNATHUS* Bleeker.

34. *himantegus* Günther; Taihoku; Wodensho; Taichu; Shimo-Tamusui River.

30. *RHODEUS* Agassiz.

35. *ocellatus* (Kner); Taihoku; Nanto.

31. *ZACCO* Jordan & Snyder.

36. *platypus* (Schlegel); Tamusui River; Shinchiku; Choso River.

37. *temmincki* (Schlegel); Tamusui River; Daiko River; Daito River; Shinchiku; Dakusui River; Rigyokutsu; Sobun River; Shimo-Tamusui River; Ako; Heirinbi; Inzampo; Tensonpi; Suwo; Giran.

38. *pachycephalus* Günther; Tamusui River.

32. *METZIA* Jordan & Thompson.

39. *mesembrina* (Jordan & Evermann); Kotosho.

33. *CANDIDIA* Jordan & Richardson.

40. *barbata* (Regan); Jitsugetsutan; Shito, Giran.

34. *HYPOPHTHALMICHTHYS* Bleeker.

41. *molitrix* (Cuvier & Valenciennes); Shori.

35. *ARISTICHTHYS* Oshima.

42. *nobilis* (Gray) (Richardson); Shori.

36. *CHANODICHTHYS* Bleeker.

43. *macrops* Günther; Tamusui River.

37. *CULTER* Basilewsky.

44. *aokii* Oshima; Jitsugetsutan.

45. *brevicauda* Günther; Kagi.

38. *CULTRICULUS* Oshima.

- 46.
- kneri*
- (Kreyenberg); Jitsugetsutan; Shimo-Tamusui River.

Family PÆCILIIDÆ.

39. *ORYZIAS* Jordan & Snyder.

- 47.
- latipes*
- (Temminck & Schlegel); Shori; Ako; Giran.

40. *GAMBUSIA* Poey.

- 48.
- affinis*
- (Baird & Girard); Shori.

Family MONOPTERIDÆ.

41. *FLUTA* Bloch & Schneider.

- 49.
- alba*
- (Zuiew); Jitsugetsutan; Shokwa; Taihoku; Kiburan, Giran.

Family ANGUILLIDÆ.

42. *ANGUILLA* Shaw.

- 50.
- mauritiana*
- Bennett; Giran; Jitsugetsutan.

- 51.
- japonica*
- Temminck & Schlegel; Taihoku; Giran.

- 52.
- sinensis*
- McClelland; not seen.

Family MUGILIDÆ.

43. *MUGIL* (Artedi) Linnæus.

- 53.
- cephalus*
- Linnæus; Taihoku.

- 54.
- oenr*
- Forskål; Inzampo; Ritakukan.

- 55.
- carinatus*
- (Ehrenberg) Cuvier & Valenciennes; Taihoku; Shimo-Tamusui River.

44. *LIZA* Jordan & Swain.

- 56.
- trocheli*
- (Bleeker); Sobun River.

Family LABYRINTHICI.

45. *POLYACANTHUS* (Kuhl) Cuvier.

- 57.
- operculatus*
- (Linnæus); Taihoku; Wodensho.

46. *MACROPODUS* Lacépède.

- 58.
- filamentosus*
- Oshima; Kotosho.

Family KUHLLIDÆ.

47. *KUHLLIA* Gill.

- 59.
- marginata*
- (Cuvier & Valenciennes); Tamusui River; Choso River; Giran River; Bokusekikaku.

Family OPHICEPHALIDÆ.

48. OPHICEPHALUS Bloch.

60. *tadianus* Jordan & Evermann; Taihoku; Raupi; Tozen River; Nanshisho.
61. *maculatus* Lacépède; Wodensho.

49. CHANNA Gronow.

62. *formosana* Jordan & Evermann; Taihoku; Toyen; Tamusui River; Jitsugetsutan.

Family GOBIIDÆ.

50. ELEOTRIS (Gronow) Schneider.

63. *oxycephala* (Schlegel); Tamusui River; Tozen River; Giran River; Buroko River.
64. *fusca* (Schneider); Buroko River.

51. BUTIS Bleeker.

65. *butis* (Buchanan-Hamilton); Taihoku.

52. SICYOPTERUS Gill.

66. *japonicus* (Tanaka); Tamusui River; Tozen River; Koanronsho; Shinchiku; Bokusekikaku; Choso River; Raoko.

53. RHINOGOBIUS Gill.

67. *candidius* (Regan); Bokusekikaku; Heirinbi; Tozen River; Shinchiku; Daiko River; Daito River.
68. *giurinus* (Rutter); Shimo-Tamusui River; Tozen River; Wodensho; Daito River; Tamusui River; Shori; Hyoko; Maruyama, Giran.
69. *taiwanus* Oshima; Tamusui River; Dakusui River; Sobun River; Shinchiku; Jitsugetsutan; Dainansho; Bokusekikaku; Inzampo.
70. *formosanus* Oshima; Shinchiku.
71. *caninus* (Cuvier & Valenciennes); Takao (not seen).

54. GLOSSOGOBIUS Gill.

72. *brunneus* (Schlegel); Taichu; Tamusui River; Ritakukan.
73. *grammepomus* (Bleeker); Inzampo.
74. *parvus* Oshima; Kizanto.
75. *abacopus* Jordan & Richardson; not seen.

55. ACANTHOGOBIUS Gill.

76. *ommaturus* (Richardson); Taihoku.

Of the seventy-six species above enumerated the following twenty-nine are artificially introduced species or semi-marine fishes or species which have been collected in an outlying island, and therefore have no bearing on the problems of the geographical distribution of the Formosan fresh-water fishes.

Introduced Species.

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|---|----------------------------------|
| 1. <i>Labeo jordani</i> . | 4. <i>Aristichthys nobilis</i> . |
| 2. <i>Ctenopharyngodon idellus</i> . | 5. <i>Gambusia affinis</i> . |
| 3. <i>Hypophthalmichthys molitrix</i> . | |

Semi-marine Species.

- | | |
|------------------------------------|---------------------------------------|
| 6. <i>Plecoglossus altivelis</i> . | 17. <i>Kuhlia marginata</i> . |
| 7. <i>Parasalanx acuticeps</i> . | 18. <i>Eleotris oxycephala</i> . |
| 8. <i>Parasalanx ariakensis</i> . | 19. <i>Eleotris fusca</i> . |
| 9. <i>Fluta alba</i> . | 20. <i>Butis butis</i> . |
| 10. <i>Anguilla mauritiana</i> . | 21. <i>Rhinogobius giurinus</i> . |
| 11. <i>Anguilla japonica</i> . | 22. <i>Rhinogobius caninus</i> . |
| 12. <i>Anguilla sinensis</i> . | 23. <i>Glossogobius brunneus</i> . |
| 13. <i>Mugil cephalus</i> . | 24. <i>Glossogobius abacopus</i> . |
| 14. <i>Mugil ocur</i> . | 25. <i>Glossogobius parvus</i> . |
| 15. <i>Mugil carinatus</i> . | 26. <i>Glossogobius grammepomus</i> . |
| 16. <i>Liza troscheli</i> . | 27. <i>Acanthogobius ommaturus</i> . |

The Species from Botel-Tobago.

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|--------------------------------|--------------------------------------|
| 28. <i>Metzia mesembrina</i> . | 29. <i>Macropodus filamentosus</i> . |
|--------------------------------|--------------------------------------|

Of the the remaining forty-seven species twenty-six (55%) are peculiar to the island.

Peculiar Species.

- | | |
|--------------------------------------|--|
| 1. <i>Pseudobagrus brevianalis</i> . | 11. <i>Spinibarbus hollandi</i> . |
| 2. <i>Pseudobagrus taiwanensis</i> . | 12. <i>Acrossocheilus formosanus</i> . |
| 3. <i>Pseudobagrus adiposalis</i> . | 13. <i>Gnathopogon iijimæ</i> . |
| 4. <i>Liobagrus nantoënsis</i> . | 14. <i>Pseudogobio brevirostris</i> . |
| 5. <i>Liobagrus formosanus</i> . | 15. <i>Pararasbora moltrechti</i> . |
| 6. <i>Formosania gilberti</i> . | 16. <i>Phoxiscus kikuchii</i> . |
| 7. <i>Hemimyzon formosanus</i> . | 17. <i>Ischikauia macrolepis</i> . |
| 8. <i>Scaphesthes tamusuiensis</i> . | 18. <i>Acheilognathus himantegus</i> . |
| 9. <i>Barbodes paradoxus</i> . | 19. <i>Zacco pachycephalus</i> . |
| 10. <i>Puntius snyderi</i> . | 20. <i>Candidia barbata</i> . |

- | | |
|------------------------------------|-------------------------------------|
| 21. <i>Chanodichthys macrops</i> . | 24. <i>Rhinogobius candidius</i> . |
| 22. <i>Culter aokii</i> . | 25. <i>Rhinogobius taiwanus</i> . |
| 23. <i>Channa formosana</i> . | 26. <i>Rhinogobius formosanus</i> . |

At present the percentage of peculiar species is extraordinarily high. But it is quite possible that some of them may be found in adjacent regions, probably in Southern China, and sooner or later a slight reduction may have to made.

Of the above-mentioned twenty-six species, the relationship of five is somewhat dubious, namely, *Hemimyzon formosanus*, *Spinibarbus hollandi*, *Pararasbora moltrechti*, *Candidia barbata*, and *Phoxiscus kikuchii*. One is very closely related to a species from the interior of Hainan, namely *Scaphesthes tamusuiensis*. Five have their nearest relatives in China, four in Corea, one in Amur Province, and eight in Japan. There is no record regarding near relatives of the remaining two, namely, *Barbodes paradoxus* and *Capoeta snyderi*. But the majority of the fishes which belong to these genera are distributed in British India, Indo-China, and China. Therefore, there is no doubt with reference to their relationship with the continental forms.

<i>Formosan Species.</i>	<i>Nearest Relatives.</i>
1. <i>Scaphesthes tamusuiensis</i> .	<i>Scaphesthes lepturus</i> from Hainan.
2. <i>Formosania gilberti</i> .	<i>Formosania stenosoma</i> from China.
3. <i>Acrossocheilus formosanus</i> .	<i>Acrossocheilus kreyenbergi</i> from China.
4. <i>Chanodichthys macrops</i> .	<i>Chanodichthys stenzi</i> from China.
5. <i>Pseudogobio brevirostris</i> .	<i>Pseudogobio sinensis</i> from China.
6. <i>Channa formosana</i> .	<i>Channa ocellata</i> from China.
7. <i>Liobagrus nantoënsis</i> .	<i>Liobagrus andersoni</i> from Corea.
8. <i>Liobagrus formosanus</i> .	<i>Liobagrus andersoni</i> from Corea.
9. <i>Gnathopogon iijimæ</i> .	<i>Gnathopogon coreanus</i> from Corea.
10. <i>Rhinogobius candidius</i> .	<i>Rhinogobius bedfordi</i> from Corea.
11. <i>Culter aokii</i> .	<i>Culter sieboldi</i> from Amur.
12. <i>Pseudobagrus taiwanensis</i> .	<i>Pseudobagrus aurantiacus</i> from Japan.
13. <i>Pseudobagrus adiposalis</i> .	<i>Pseudobagrus aurantiacus</i> from Japan.
14. <i>Pseudobagrus brexianalis</i> .	<i>Pseudobagrus aurantiacus</i> from Japan.
15. <i>Ischikauia macrolepis</i> .	<i>Ischikauia steenackeri</i> from Japan.

16. *Zacco pachycephalus*. *Zacco temmincki* from Japan.
 17. *Acheilognathus himantegus*. *Acheilognathus cyanostigma* from
 Japan.
 18. *Rhinogobius formosanus*. *Rhinogobius hadropterus* from Japan.

Not only such a relationship is manifested by the peculiar species, but by the rest of the fresh-water fishes as well. Of the twenty-one species, which occur outside of Formosa, *Clarias fuscus*, *Capoeta semifasciolata*, *Distachodon tumirostris*, *Culter brevicauda*, *Cultricus kneri*, *Ophicephalus tadianus*, and *Ophicephalus maculatus* are species of southern affinities, because they are distributed in Indo-China and South China, but not to the north of the Yang-tze-kiang. *Polyacanthus* is a genus of the Indo-Malayan type, extending into the Malay Archipelago, but not occurring in eastern Asia. Such being the case, *Polyacanthus operculatus* may be included in this category, though it has been recorded from Tiên-tsin, North China.

Eleven species are of more or less general distribution, extending from South China to Corea and Japan proper, and one occurs only upon the Chinese mainland. Finally, *Sicyopterus japonicus* is one of the peculiar species of Japan, and its relationship is somewhat dubious, as it is not known to occur on the Asiatic continent.

It will thus be seen that all the Formosan fresh-water fishes which have Chinese affinities differentiate into more or less distinct species, while those of southern affinities have remained unchanged. Moreover, eight per cent of the non-peculiar species have been recorded from the Chinese mainland. These two facts explain very clearly that the island had been preoccupied by the fresh-water fishes of the Chinese fauna when those of the southern affinities appeared through South China.

Next to the prevalence of Chinese affinities, the total absence of any indication of affinity to the fresh-water fish fauna of the Philippine Islands and Malay Archipelago is a very striking fact. As shown in the table, only one species is recorded from the Philippines, namely *Ophicephalus maculatus*. However, as it also occurs in South China, its way of dispersal is clearly indicated, though there is no record of it in India and the Malay Archipelago. *Cyprinus carpio* is another species which has been recorded from Java. But it is evident that the carp is not a native of Java, but an introduced species.

According to Leonhard Stejneger, there exists the same relationship between Formosa and the Philippine Islands with regard to the her-